



## Periodization of Sports Training: Between Science and Personal Trainer Practice

### Sports Training Periodization: Between Science and the Practice of the Personal Trainer

Author: Silvana Aquino de Andrade

Graduated in Physical Education, from the Edson Queiroz Foundation, University of Fortaleza.

#### Summary

Periodization of sports training is one of the pillars of Physical Education and fitness, representing a well-established methodology for organizing, planning, and optimizing training stimuli. Initially developed in the context of high-performance sports, this approach has also been used in non-competitive environments, such as gyms and studios, meeting diverse objectives such as health, aesthetics, and quality of life. This article analyzes the application of different periodization methodologies—classical, undulating, and contemporary—in multiple contexts, ranging from athletes to recreational practitioners and clients with physical limitations. The study combines historical review, recent scientific evidence, and professional practices, discussing how personal trainers can apply this knowledge in an adapted manner. Throughout the analysis, the principles of biological individuality, progressive overload, and stimulus variability are emphasized, as they are fundamental to promoting effective and sustainable results. The article also addresses specific adaptations for the elderly, beginners, and people with special needs, highlighting the importance of scientifically informed and humanized practice in the exercise of the profession.

**Keywords:** Periodization; Personal trainer; Hypertrophy; Performance; Physical Education.

#### Abstract

Sports training periodization is one of the pillars of Physical Education and strength and conditioning, representing a consolidated methodology for organizing, planning, and optimizing training stimuli. Initially developed within high-performance sports, this approach has also been applied in non-competitive settings, such as gyms and studios, addressing goals such as health, aesthetics, and quality of life. This article analyzes the application of different periodization methodologies — classical, undulating, and contemporary — across multiple contexts, ranging from athletes to recreational practitioners and clients with physical limitations. The study

articulates a historical review, recent scientific evidence, and professional practices, discussing how personal trainers can adapt this knowledge effectively. Throughout the analysis, principles such as biological individuality, progressive overload, and stimulus variability are emphasized as fundamental for achieving effective and sustainable results. The article also explores specific adaptations for older adults, beginners, and individuals with special needs, highlighting the relevance of scientifically grounded and humanized professional practice.

**Keywords:** Periodization; Personal trainer; Hypertrophy; Performance; Physical Education.

## 1. Historical and theoretical review of periodization

The history of sports training periodization dates back to the 20th century, when the need to structure physical stimuli intensified due to the pursuit of athletic performance in international competitions. The classic model, formulated by Lev Matveev in the 1960s, proposed dividing training into macrocycles, mesocycles, and microcycles, establishing progressive goals and peak performance at specific moments of the season (MATVEEV, 1964).

This framework was based on biological adaptation to stress and the principle of supercompensation, seeking to maximize results through long, linear cycles. Although initially designed for high-performance athletes, the model soon became a reference for Physical Education professionals in various contexts.

Thomas Bompa (1999), considered one of the greatest exponents of periodization theory in the West, expanded Matveev's ideas and adapted them to the contemporary realities of sport, detailing methods of manipulating variables such as intensity, volume and training density.

Bompa's proposal became fundamental for personal trainers and fitness coaches, offering practical support for load control across different audiences. However, criticism of the rigidity of the linear model emerged in the late 20th century, particularly because many athletes and recreational exercisers did not experience sustainable gains over time. This paved the way for new organizational models, more flexible and adaptable to individual demands.

In this context, undulating periodization gained prominence. Charles Poliquin (1988) was one of the pioneers in proposing that training loads vary not only between long phases, but also between days or weeks, creating more dynamic stimuli. This approach emerged in response to the observation that constant variation favored both physical performance and psychological motivation. Later studies reinforced that undulating periodization could be more effective for certain groups, especially those seeking strength and hypertrophy, without the long adaptation periods required by the classical model (FLECK; KRAEMER, 2014).

With the advancement of sports science, contemporary models have emerged, notably block periodization, systematized by Issurin (2008). This methodology advocates concentrating stimuli in specific training blocks, such as maximum strength, endurance, or power, optimizing adaptations in a shorter timeframe. Unlike linearity or wave-like oscillations, this model seeks to address the growing complexity of the sports calendar and the individual needs of athletes. This approach has gained traction not only in elite sports but also in recreational settings, as it allows for greater individualization.

It's worth noting that periodization should be understood as a dynamic process, not a rigid formula. The concept of specific adaptation to training demands, present in Selye's (1950) studies on the General Adaptation Syndrome, reinforces the importance of continually adjusting stimuli. Personal trainers working in gyms and studios must therefore understand that historical and theoretical knowledge of periodization serves as a foundation, but its application requires sensitivity to interpret each client's biological and psychological response.

Theory supports practice, but does not determine it absolutely.

Thus, the historical and theoretical review of periodization reveals not only the evolution of models over time but also the need for constant professional development. When transitioning between the classical, wave-like, and contemporary models, personal trainers must consider factors such as prior experience, individual goals, and each client's limitations. As Issurin (2010) and Schoenfeld (2016) point out, the future of periodization is moving toward a hybrid approach, combining elements of different methodologies, always guided by scientific evidence.

Thus, the initial chapter of this study establishes the conceptual basis necessary to understand the impacts of periodization on professional practice.

## **2. Scientific evidence on strength, hypertrophy and aerobic performance**

The scientific literature on sports training periodization has grown significantly in recent decades, offering robust data on the effectiveness of different models on key variables such as strength, hypertrophy, and aerobic conditioning. Pioneering studies already indicated that planned manipulation of intensity and volume is more effective than random training, but the discussion gained depth with meta-analyses published since the 2000s. Prestes et al. (2019), in research conducted with recreational bodybuilders, showed that both linear and undulating periodization promote muscle strength gains, but undulating periodization stood out for maintaining greater participant engagement due to the variety of stimuli. This additional motivation reinforces the importance of considering

psychological aspects in training, since adherence is crucial for long-term results.

In the field of muscle hypertrophy, the debate is even more intense. Schoenfeld (2016) highlighted that weekly training volume, combined with intensity control, is a determining factor for muscle gains, regardless of the periodization model. However, when comparing non-periodized programs to periodized programs, the latter offer a significant advantage, as the planned variation of stimuli helps prevent adaptive plateaus (GRGIC et al., 2017). Thus, the literature demonstrates that, although the central principle of hypertrophy is the progressive increase in load, the way this load is organized over time directly impacts the quality of adaptations. This finding is highly relevant to the work of personal trainers in gyms.

Regarding aerobic performance, the evidence is also consistent in favor of periodization.

Research by Issurin (2010) shows that athletes undergoing periodized running programs showed significant improvements in  $\dot{V}O_{2\max}$  compared to unstructured programs.

This data corroborates the idea that the planned manipulation of cardiorespiratory stimuli — alternating low-intensity continuous sessions with high-intensity intervals —

promotes greater physiological efficiency. For recreational users, this principle can be translated into accessible protocols, such as the strategic inclusion of weekly interval training, which increases calorie expenditure and contributes to cardiovascular health, in addition to promoting motivation because it is less monotonous than uniform workouts.

A relevant aspect is the comparison between different periodization methodologies for different audiences. For athletes, block periodization appears to offer greater efficiency in achieving peak performance in specific competitions (ISSURIN, 2008). For bodybuilders with aesthetic goals, undulating periodization proves more appropriate, offering varied stimuli that are adaptable to time constraints and training availability (FLECK; KRAEMER, 2014). For beginners, linear programs still prove effective, precisely because of their simplicity and clarity in load progression. This scenario highlights that periodization is not a one-size-fits-all formula, but rather a set of tools that should be adjusted according to the practitioner's profile and goals.

Another point raised by studies is the impact of periodization on injury prevention. Planned variation of stimuli and respect for recovery phases significantly reduce the incidence of overuse injuries, something crucial for high-performance athletes but equally relevant for recreational athletes (FRAGALA et al., 2019). The human body does not respond linearly to physical stress, and a lack of planning can result in accumulated fatigue and inflammatory processes. For personal trainers, this finding reinforces the importance of organizing training in a periodized manner, even when the goals seem simple, such as weight loss or health maintenance.

In summary, scientific evidence confirms that periodization is a superior method to unstructured training, offering clear advantages in strength, hypertrophy, and aerobic performance. However, choosing the ideal model depends on an individualized analysis of the client. Science offers solid parameters, but it is up to the professional to interpret these data and translate them into practice. The applicability of periodization transcends the sports world, making it an indispensable resource for any personal trainer who wishes to provide quality, safe, and effective training.

### 3. Practical applications for personal trainers in gyms and studios

Personal trainers' work in settings such as gyms and studios requires adapting scientific concepts to the everyday reality of their clients. Unlike elite sports, where the goal is to achieve maximum performance in competitions, recreational athletes mostly seek aesthetics, weight loss, physical conditioning, or improved overall health. In this context, periodization should be understood as a strategic organizational tool, not a rigid model. As Fleck and Kraemer (2014) point out, the key is to transform complex principles into viable, motivating, and effective routines for different client profiles.

In practice, one of the most common forms of periodization is the weekly wave model. Clients who attend the gym three times a week, for example, can complete different sessions: one focused on maximum strength, another on muscular endurance, and a third on hypertrophy. This model maintains engagement and promotes diverse adaptations, as indicated by studies by Prestes et al. (2019), which demonstrated greater adherence in programs with frequent variation in stimuli. For the personal trainer, this type of planning also facilitates prescription, as it allows for different physical capacities to be worked on within the same week, optimizing results.

Another practical example is the strategic use of high-intensity interval training (HIIT) within the periodization of clients seeking weight loss. Research by Gibala and McGee (2008) demonstrated that this type of stimulus promotes rapid metabolic adaptations, with a significant increase in post-workout energy expenditure. Incorporating HIIT in a planned manner into weekly or monthly cycles enhances body fat reduction without compromising strength training. For clients with limited time, this approach proves even more efficient, ensuring noticeable results in less time, which increases satisfaction and loyalty.

It's important to emphasize that the practical application of periodization should consider not only the client's goals but also their limitations. Individuals with a history of injuries, medical restrictions, or low fitness levels require a more gradual approach.

In this sense, simplified linear programs still have space, especially at the beginning of the process.



As the American College of Sports Medicine (2020) points out, safe progression is crucial for beginners' adherence, and an early increase in intensity can compromise motivation or even lead to injury. Individualization, therefore, is essential for effective periodization.

In the daily routine of gyms and studios, personal trainers must also deal with logistical and behavioral issues. Many clients don't follow fixed workout routines, which demands flexibility from the professional. In this context, the application of more dynamic models, such as undulating or contemporary periodization, offers greater adaptability. Literature shows that adaptable programs increase gym retention rates, a factor directly linked to the success of the personal trainer's work (SCHOENFELD, 2016). Therefore, daily practice reinforces the need to master different methodologies to offer tailored solutions.

Another key point is communication between personal trainer and client. Explaining the logic of periodization in an accessible way increases understanding of the process and strengthens engagement. Many practitioners believe that results depend solely on intensity, disregarding the importance of load and recovery planning. When the professional demonstrates that variation is part of the strategy, the client perceives the process as meaningful and tends to follow the instructions with greater discipline. This educational aspect differentiates the personal trainer who merely prescribes exercises from one who acts as a true health and performance consultant.

In conclusion, the practical application of periodization in gyms and studios is a balancing act between science and everyday reality. The personal trainer must be able to translate theoretical concepts into adapted, accessible, and motivating workouts. As Fleck and Kraemer (2014) demonstrate, the effectiveness of the process depends not only on the choice of model but also on the professional's ability to adjust variables according to individual needs. In this sense, periodization becomes not only a planning technique but also a tool for professional development and ensuring sustainable results.

#### **4. Adaptations for the elderly, beginners and people with physical restrictions**

Applying periodization to special populations requires additional care, as their adaptive capacity varies significantly compared to that of young, healthy individuals. In the case of the elderly, the literature clearly highlights the benefits of prescribing periodized programs.

Fragala et al. (2019), speaking in a position statement from the National Strength and Conditioning Association (NSCA), point out that muscle strength can be preserved and even increased when stimuli are planned gradually and with adequate recovery time. The loss of muscle mass associated with aging, known as sarcopenia, is one of the main causes of reduced functional autonomy, but periodized programs, especially undulating ones, promote consistent gains and reduce the risk of injury.

For beginners, periodization should be applied in a simplified manner, prioritizing technical learning of movements and the development of a solid physical foundation. The American College of Sports Medicine (2020) emphasizes that, for individuals with no prior training experience, linear programs are still the most recommended, due to the clarity and predictability of load progression. This approach avoids excessive overload and ensures that the practitioner understands the basic principles of training. After this initial period, which can vary between three and six months, it is possible to introduce undulating or contemporary variations to maintain engagement and accelerate adaptations.

When it comes to people with physical limitations, such as those with cardiovascular, metabolic, or orthopedic conditions, periodization must be even more individualized. In this group, the personal trainer must work closely with health professionals to ensure that stimuli do not exceed safe limits. Studies by Rhea et al. (2003) show that careful manipulation of volume and intensity in periodized programs can significantly improve health indicators, such as blood pressure and lipid profile, without compromising safety. The key is to adapt training variables to the clinical condition, reducing intensity and increasing the emphasis on movement control.

Another relevant aspect is psychological adaptation. Elderly people and beginners often fear heavy loads or complex exercises, which requires personal trainers to be sensitive enough to introduce periodization in an accessible way. Research by Carvalho and Marques (2017) highlights that perceived self-efficacy is crucial for adherence to training programs. Therefore, starting with short cycles, achievable goals, and constant feedback can be more effective than implementing sophisticated models right away. This strategy strengthens client confidence and contributes to sustainable results.

In practical terms, planned variation should consider both intensity and type of exercise. In older adults, alternating between strength, muscular endurance, and balance training promotes broad functional benefits, such as reducing the risk of falls and improving quality of life (FRAGALA et al., 2019). For beginners, including cardiorespiratory conditioning sessions interspersed with resistance exercises helps the body's overall adaptation. For people with physical limitations, personalization is even more important, and periodization can assume longer, more conservative cycles, prioritizing safety over performance.

Thus, applying periodization to special groups reinforces that the concept should not be restricted to athletes or advanced practitioners. On the contrary, its importance grows precisely among those who are more physically vulnerable. The literature confirms that, when adapted, periodization contributes not only to physical gains but also to maintaining health, motivation, and autonomy. In this context, the personal trainer needs to master the theory to transform it into a humanized and individualized practice, offering an excellent service.

## 5. Integrating the science of periodization with everyday practice

Integrating science and practice is one of the greatest challenges in Physical Education and personal trainers. Many professionals still rely on empirical methods or personal experiences, disregarding the evidence available in the scientific literature. However, consolidating periodization as a prescription tool requires that theoretical models be applied in a practical and accessible way in the daily routine of gyms and studios. As Fleck and Kraemer (2014) point out, bridging the gap between theory and practice depends on the professional's ability to understand the science and adapt it to their clients' realities.

One of the key integration points is the use of training monitoring. Studies by Issurin (2010) indicate that monitoring the physiological and psychological response to training is essential for continuously adjusting loads. In practice, this means using resources such as training sheets, apps, or even verbal feedback to assess the subjective perception of exertion (RPE). This type of data helps the personal trainer make immediate adjustments, transforming periodization into a dynamic and responsive process. Thus, science and practice converge to offer greater effectiveness and safety.

Another key aspect is understanding biological individuality. Research by Schoenfeld (2016) reinforces that response to training varies widely between individuals, even when undergoing the same program. For the personal trainer, this means that science provides general guidelines, but practice requires constant customization. Periodization, therefore, should be seen as a guide, not an immutable rule. This flexible approach allows the professional to respect the specific needs of each client, without losing sight of the fundamental principles of prescription.

In everyday reality, the integration of science also involves long-term planning. Many clients stop training after a few months, whether due to lack of motivation, slow results, or scheduling conflicts. In this sense, periodization can be used as an engagement tool, as it organizes the process into short-, medium-, and long-term goals. As Prestes et al. (2019) point out, clear planning increases the perception of progress, a determining factor for continued practice. By explaining the logic of periodization, the personal trainer strengthens the client's confidence in the process.

Science also provides support for the inclusion of new methods and technologies in training. The use of heart rate monitoring devices, digital training platforms, and validated intensity protocols expand the application possibilities of periodization. For personal trainers, this resource represents an opportunity to offer a differentiated service based on objective data. However, the practice must be accompanied by critical thinking, avoiding fads and maintaining a focus on safety and effectiveness. As Grgic et al. (2017) emphasize, scientific evidence should be the central criterion for choosing strategies.

Finally, the integration of science and practice requires professionals to be constantly updated. The field of Physical Education is dynamic, and new studies are published continuously. Personal trainers who maintain contact with scientific literature expand their ability to offer effective and well-founded interventions. Periodization, in this context, is not only a training organization technique but also a reflection of the professional's approach to knowledge. Science-based practice differentiates personal trainers, enhancing their performance and ensuring greater credibility with clients and society.

## 6. Periodization as a motivation and adherence strategy

One of the biggest challenges faced by personal trainers in gyms and studios is maintaining client motivation and adherence to their exercise program. Scientific literature shows that most practitioners abandon regular training in less than six months, mainly due to monotony or lack of perceived results (DISHMAN et al., 2013). In this sense, periodization presents itself not only as a training organization technique but also as a powerful engagement tool. By systematically varying stimuli, cycles, and goals, the personal trainer can keep clients engaged, offering a dynamic experience that conveys a sense of constant progress.

Intrinsic motivation, related to pleasure and personal satisfaction with the practice, is reinforced when the client perceives that their training follows a structured plan. Research by Ryan and Deci (2000), based on Self-Determination Theory, shows that clarity of goals and a sense of competence increase adherence to physical activities. Applied to periodization, this theory shows that breaking goals into smaller cycles, with tangible results in short timeframes, contributes to strengthening internal motivation. This strategy is especially useful for beginners, who require frequent positive reinforcement.

Extrinsic motivation can also be enhanced by periodization. Many clients seek external rewards, such as improved appearance, athletic performance, or social recognition. In this context, organizing training into well-defined phases provides clear parameters for measuring progress. As Prestes et al. (2019) point out, monitoring results within periodized programs increases the perception of effectiveness, reducing the dropout rate. By presenting objective evidence of progress, the personal trainer strengthens the bond of trust with the client and enhances their professional credibility.

Another fundamental aspect is the role of novelty in periodized programs. Studies by Ratamess (2012) highlight that varying stimuli not only enhances physiological gains but also reduces monotony and increases psychological engagement. Alternating between strength, endurance, power, and flexibility workouts, organized into planned cycles, creates a more engaging experience. For clients who have been going to gyms for years, this strategy is especially relevant, as it prevents stagnation and renews interest in the practice.

Periodization also contributes to building a narrative of progress, essential for strengthening the bond between client and professional. When a personal trainer presents a structured plan that outlines short-, medium-, and long-term goals, the client begins to see their training as part of a larger process, not just as isolated sessions. This vision of continuity fosters commitment and strengthens the habit of practicing. As Schoenfeld (2016) and Fleck and Kraemer (2014) emphasize, the psychological aspect of training should be considered as important as the physiological.

Therefore, by integrating periodization as a motivation and adherence strategy, the personal trainer increases not only the effectiveness of the program, but also the longevity of the relationship with the client. Science shows that planned variation increases engagement, while practice confirms that motivated clients remain active longer. In this sense, periodization is no longer just a prescription technique; it assumes a strategic role in the professional success and social impact of Physical Education.

## 7. Limitations and future perspectives of periodization

Despite its proven effectiveness, periodization in sports training is not without its criticisms and limitations. One of the main points raised by researchers such as Kiely (2012) is that classic models were developed in specific contexts, primarily aimed at high-performance athletes, and may not fully reflect the needs of recreational athletes. Furthermore, the competitive calendar, the basis for many traditional models, does not apply to the reality of gyms, where attendance and goals vary widely among clients.

This discrepancy requires constant adaptations, which can create difficulties for less experienced professionals.

Another limitation concerns biological individuality and the unpredictability of adaptive responses. Although periodization offers guidelines, the human body does not respond linearly to stimuli, and factors such as sleep, diet, stress, and genetics influence results. Schoenfeld (2016) emphasizes that even in homogeneous groups, responses to training can vary considerably, which limits the universal applicability of the models.

For the personal trainer, this means that periodization should be interpreted as a flexible guide, not an immutable script.

From a scientific perspective, there are still gaps in the literature. Grgic et al. (2017) point out that, although meta-analyses confirm the superiority of periodization over unstructured programs, there are few direct comparisons between the different models. Thus, stating that undulating periodization is always superior to linear periodization, or that block periodization is best for all contexts, still lacks conclusive evidence. This limitation leaves room for

new studies that evaluate the relative effectiveness of methodologies in different population profiles, including the elderly, women and individuals with specific clinical conditions.

Another challenge is practical application in resource-limited settings. In low-income gyms or in confined spaces, it's not always possible to fully implement the models described in the literature. In these cases, personal trainers must adapt periodization to the current situation without compromising safety or the fundamental principles of the prescription. This limitation reinforces the importance of creativity and improvisation on the part of the professional, who must combine science and practice to meet their clients' needs.

Regarding future prospects, the integration of technology into periodization stands out. Physiological monitoring devices, training apps, and performance analysis software allow for real-time adjustments, making prescriptions more precise and personalized. Studies by Hackett et al. (2019) suggest that the combination of training science and technology could lead to a new periodization paradigm, characterized by greater individualization and flexibility. This trend points to a future in which each client will have access to tailored programs based on objective data.

In short, the limitations of periodization do not diminish its relevance, but rather indicate the need for constant evolution. Professionals must be aware of the limits of traditional models, recognizing that practice requires continuous adaptation. At the same time, the literature suggests promising ways to overcome these barriers, especially with the support of technology and new research. The future of periodization, therefore, lies not in replacing models, but in integrating different approaches, combining theory, practice, and innovation.

## Conclusion

Periodization of sports training represents one of the most solid and versatile concepts in Physical Education, consolidating its position as an indispensable resource in both high-performance and recreational sports. Throughout this article, we observed that the historical evolution of periodization models, from Matveev's classic proposals to contemporary block and wave-like methodologies, reflects the need for constant updating and adaptation to the demands of different audiences. This theoretical framework allowed us to understand that, more than a training organization technique, periodization constitutes a dynamic process that combines science, practice, and individualization.

The scientific evidence analyzed demonstrates that periodized programs offer clear advantages over unstructured training, promoting superior gains in strength, hypertrophy, and aerobic performance, in addition to reducing the risk of injury. However, choosing the right model must consider factors such as prior experience, individual goals, and limitations of each practitioner. In this sense, the role of the personal trainer assumes a central role, as it is the professional's responsibility to interpret the science and transform it into accessible, safe, and motivating practice.

This aspect is even more evident when prescribing for the elderly, beginners and people with physical restrictions, who require careful adaptations.

Another highlight is the contribution of periodization to the motivation and adherence of practitioners. By organizing the process into cycles, goals, and stimulus variations, the personal trainer creates a narrative of progress that strengthens engagement and reduces dropout rates. This factor, combined with the potential for individualization and integration with technological resources, projects periodization as a strategic tool for the future of Physical Education, both in the fields of performance and public health.

However, the study also revealed limitations, especially regarding the universal application of traditional models. Individual variability, environmental conditions, and infrastructure differences require flexibility and creativity from practitioners. Furthermore, the scientific literature lacks broader direct comparisons between methodologies, reinforcing the need for further research to deepen our understanding of the relative effectiveness of each approach in different populations.

Therefore, it can be concluded that training periodization should not be understood as a ready-made recipe, but rather as a guide based on science and adjusted through practice. The role of the personal trainer is essential in this process, acting as a mediator between theory and everyday reality, capable of applying the principles of periodization in an individualized and humanized manner. In this way, periodization consolidates itself as an instrument not only for efficient prescription but also for enhancing the profession, promoting health, and building sustainable results.

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