

MENTAL PREPARATION IN SPORT SHOOTING: A KEY FACTOR IN ACHIEVING ELITE PERFORMANCE

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Abstract: This article seeks to draw the attention of specialists to the training of high-performance athletes, emphasizing the importance of incorporating mental training techniques into physical training programs. Such an integrated approach can enhance competitive performance by fostering the balanced development of two essential dimensions: physical and psychological. In today's context—shaped by significant behavioral changes and constant emotional challenges—maintaining an optimal psychological state is just as vital as physical fitness. Increasingly, the specialized literature highlights the psychological mechanisms that can decisively impact sports performance, often being the factor that separates first place from second. In this regard, we believe that this paper, through its critical analysis of recent research in the field, can make a meaningful contribution to the advancement of specialized training programs, especially within sport shooting, a discipline inherently characterized by its strong mental component.

Keywords: *mental training, mental balance, integrated preparation, shooting sport, sport performance, sport psychology*

Introduction

Elite sports performance is the result of balanced and rigorous training that targets both the physical and psychological dimensions of the athlete. In the context of high-level competitions, differences between athletes with similar physical abilities can often be determined by seemingly minor factors such as the ability to manage stress (Dina, 2024), resilience in the face of a bad day, or the capacity to maintain focus under intense pressure. However, in high-performance sports, the concept of a “bad day” is not accepted as a justification for suboptimal results, as expectations are extremely high—from the athletes themselves, as well as from coaches, families, fans, and supporting institutions.

A significant obstacle in the full development of athletes often lies in the resistance of coaches, particularly those from older generations, to integrating mental training into physical preparation programs. This conservative attitude is especially visible in disciplines such as sport shooting, where, paradoxically, the mental component plays a decisive role in achieving performance. In such sports, emotional control, attentional

regulation, and the training of cognitive responses become key factors in attaining success (Anton et al., 2019).

Even an athlete with exceptional physical potential may be surpassed by a less physically gifted opponent if that opponent possesses superior mental stability, a higher capacity for concentration, or more effective strategies for emotional self-regulation. Therefore, sports performance today cannot be conceived without a holistic approach that gives equal weight to physical, technical, tactical, and psychological training.

A major structural issue in sports performance does not lie solely in the attitudes of coaches, but in the lack of adequate funding to support the formation of multidisciplinary technical teams, including specialized sport psychologists focused on mental preparation. Currently, the responsibility for the psychological component of training unrealistically falls to the coach, who is often overburdened and insufficiently trained in this area. Although some younger coaches possess basic knowledge of sport psychology and may apply certain techniques to support their athletes mentally, this is far from being standard practice.

Among traditionally trained and more experienced coaches, openness toward modern mental training methods is, unfortunately, often limited. A lack of interest or formal education in sport psychology leads to clear disadvantages for athletes, who are deprived of the necessary support to cope with pressure, emotional challenges, or temporary failures. This situation further contributes to major inequities among athletes, as some teams benefit from full support staff—including coach, physiotherapist, sports physician, and psychologist, capable of developing an athlete from the ground up, while others operate with minimal resources, leaving athletes vulnerable and inadequately supported in their competitive journey.

As a result, the full professionalization of support teams and the recognition of the role of mental preparation specialists become essential conditions for achieving high-level performance and ensuring equity among athletes from different backgrounds.

Sports psychology is an interdisciplinary field where study analyzes and human behavior in the context of sports and different type of effort. These specialists focus on the well-being of athletes, whether amateur or professional. Because mental abilities often make the difference between success and failure, sports psychologists provide proactive strategies for athletes, coaches, parents, and support staff. These strategies help them manage psychological factors and optimize performance, while also understanding how sports influence thoughts, emotions, and behaviors (Williams & Straub, 2021). Athletes, coaches, parents and support staff are the subjects who can benefit from the therapy offered by these specialists. The goal is to create a psychological profile of the athlete in relation to the particularities of the physiological demands of the sport practiced. A sports psychologist can intervene "therapeutically" to improve athletes' performance, support personal and social development through sports, and address the challenges specific to sports environments or organizations (Tod, 2022).

Accelerated research into the techniques and effects of psychological interventions in sport allows us to better understand the interventions and psychological variables that lead to increased sports performance. This will

highlight areas that can be worked on to reach the athlete's maximum potential (Reyes-Bossio et al., 2022).

Purpose of the Article

The central aim of effective preparation in performance sports is to achieve a balance between the athlete's physical and psychological dimensions. This principle becomes especially relevant in sports with a high degree of mental demand, such as sport shooting, where precision, self-control, and emotional stability can determine the difference between success and failure—even when the athletes' physical and technical abilities are comparable. In a competitive context where the margin for error is minimal, the idea of a "bad day" is no longer a valid excuse for poor performance. Psychological pressure is constant, and expectations—from coaches, the public, sports institutions, and especially the athletes are always high.

Sport shooting, by its very nature, presents a unique challenge: the athlete must manage their internal states in conditions of apparent calm but maximum tension. There is no physical contact with the opponent, no visible agitation, yet every movement, every thought, or emotional fluctuation can influence the outcome. In this context, mental training is not an optional addition, but a fundamental component of preparation (Ortega & Wang, 2018). Cognitive stability, sustained focus, the ability to eliminate distractions, and emotional regulation are elements that, without systematic psychological training, do not develop spontaneously and remain persistent vulnerabilities.

Shooting as a competitive sport and the psychological variables it requires

From the perspective of elite shooting athletes, physical training is a key factor in performance (Mon-López et al., 2019). Air rifle shooting and small-caliber shooting are also sports with special requirements such as accuracy (Spancken et al., 2021), precision (Spancken et al. 2021, Sobhani et al., 2022), because they do not require physical effort, athletes remain still, which simplifies the collection of neural activity (Li et al., 2025).

Various systematic studies have highlighted the significant impact of psychological variables on sports performance. For example: Park & Jeon (2023) recently conducted an analysis of articles between 1992 and 2021

and concluded that research that dreamed of training psychological skills had as topics of interest 1) stress control through mental resilience and adaptation mechanisms, 2) anxiety control, maintaining or increasing motivation and self-confidence, self-efficacy, 3) flow and mindfulness, 4) emotion control. The conclusion of the study was that better performance can be achieved especially through techniques that increase the athlete's stress and anxiety management skills along with the athlete's acquisition of coping mechanisms (Park & Jeon 2023).

Stolarski et al (2019) discuss the theory of temporal perspective in the field of sports and the influence of time on attitudes, emotions and sports performance, the theoretical conceptual model that regulates sports performance through three major mechanisms: motivation and commitment, regulation of affective emotions, and self-evaluation of achieved performances.

Abilities and Differences among Shooting Athletes

Shooting performance is influenced by a number of psychological and neurological abilities, with notable differences among athletes, particularly by experience level and gender.

Adolescents with higher levels of shooting performance generally demonstrate better pre-competitive mental state and greater emotional regulation. They can maintain dynamic autonomic nervous balance and effectively focus their attention resources on the shooting task during competition, leading to optimal performance (Zhao et al., 2024).

Gender neurological differences, neural mechanisms and skill learning in shooting

In shooting athletes, Badarin et al. (2023) investigated the neural and behavioral mechanisms required for skill development. By comparing an experimental paradigm adapted for inexperienced individuals with a multisensory paradigm, the study indicated that a multimodal analysis approach is extremely valuable in studying the complex processes involved in learning visual-motor control (Badarin et al., 2023). This approach has significant potential for optimizing training processes in shooting sports.

There are distinct neural differences between men and women in terms of brain activity patterns specific to shooting (Li et al., 2025).

Zhang et al.'s (2025) study revealed that male shooting athletes exhibit better brain plasticity, superior motor control, better attention, and enhanced emotional regulation compared to female athletes.

On the other hand, Lulu et al. (2025) highlighted that female athletes use more regulation strategies, albeit with lower involvement. Interestingly, by synchronizing EEG data with trigger events in novice shooting athletes, it was observed that female athletes have superior aiming stability, which may manifest itself in superior competitive behavioral performance (Li et al., 2025).

For novice shooters, emotional regulation is a major requirement in training. They tend to use emotional disengagement more to manage pressure. Interestingly, elite athletes who achieve superior performance also apply disengagement, as too much emotional involvement can reduce the performance results (Lulu et al., 2025).

Anxiety Monitoring and Performance Evaluation

As an objective indicator for monitoring pre- and inter-competition anxiety, Zhao et al. (2024) propose heart rate monitoring (number of heart beats per minute). In addition, other evaluation methods used in the field include the "Shooter's Coordination Analysis Target Training (SCATT)" and the "Attention Network Test (ANT)" (Bakhtafrooz et al., 2025).

Some key factors in shooting athlete performance and research directions was presented on the study of Sobhani et al. (2022) on elite and non-elite shooters in Iran identified 16 crucial factors influencing performance, grouped into anthropometric, physiological and psychological categories. The results showed that elite shooters excel in dynamic balance (assessed by the Y-test), upper body strength (abdominal area) and intrinsic motivation. They also have a lower resting heart rate compared to non-elite athletes.

From this brief review of the literature, it is clear that there is a need for further research on the psychological elements of this sport, the results of which could be effectively integrated into shooting training.

Spancken et al. (2021) systematized the differences between air rifle and small-caliber shooting, but the limited number of studies

(only 40 articles) did not allow them to formulate solid evidence-based conclusions for elite athletes in these disciplines. For this reason, future research should focus on identifying the complex relationships between factors and processes that influence performance. Based on these findings, Sobhani et al. (2022) suggest that physiological and psychological training should be integrated into shooters' training programs to improve their performance.

To address the situations particular to this sport, flexible training that integrates various strategies and optimizes situation-performance congruence has the potential to significantly improve performance (Lulu et al., 2025).

In the context of shooting competitions, neurofeedback can be an effective technique for self-regulating brain activity. It can reduce internal conflicts and increase orientation and attention of athletes (Bakhtafrooz et al., 2025).

Training Solutions and Techniques

Despite this, current sports training practices in many contexts remain shaped by a fragmented vision, in which the psychological component is often ignored or minimized. Instead of benefiting from the guidance of trained sport psychologists, many athletes—including those in shooting—end up relying solely on the competencies of their coach. This approach is deeply limiting, as very few coaches possess formal training in sport psychology, and those who do often struggle to effectively integrate this knowledge into an already demanding technical and tactical training regime.

In sport shooting, where success depends overwhelmingly on mental control, the absence of a sport psychologist on the support team poses a significant risk. A shooter who excels in technical training may completely underperform in official competitions if they lack the mechanisms to regulate anxiety, maintain self-confidence, or quickly recover after a missed shot. Without a structured mental training program, athletes remain exposed to the unpredictability of their own emotional states, and performance becomes fragile, inconsistent, and dependent on difficult-to-control factors.

What is even more concerning is that this vulnerability does not affect all athletes equally. Those from well-funded sports centers, where sport psychologists are a

regular part of the preparation staff, enjoy a clear advantage over those training in environments without access to such resources. Thus, not only is the effectiveness of training compromised, but systemic inequities are also perpetuated among athletes, violating fundamental principles of fairness in sport.

In conclusion, in sports such as shooting, where the pressure is invisible yet omnipresent, the professional integration of mental training must become an absolute priority. The sport psychologist is not a luxury or optional addition to the team, but a key element in the formation of a complete athlete. Without a clear and strategic investment in this direction, performance remains circumstantial, and the individual potential of athletes—even those with exceptional technical abilities—may never be fully and consistently realized.

Research in the field of sports psychology (the scientific basis of sports psychology)

Röthlin et al. (2016, 2020) analyzed the differences in the improvement of functional athletic behavior (a prerequisite for optimal performance) before and after a four-session, 2-hour intervention provided by a qualified sports psychologist who applied psychological skills training, and a mindfulness-based intervention compared to a control group. Both interventions had positive effects in improving psychological factors relevant to performance (emotion management and attention control). The results of the study suggest that different intervention modalities can lead to the desired results (Röthlin et al., 2020).

The control of the behavior that the athlete applies, both during training and in competitions, can be shaped by various psychological techniques that can be learned by him, their purpose is to regulate tense psychological states that can negatively influence performance.

Some rules and consensus for coaching practical athletes' approach for mental well-being are presented by Bissett et al. (2022) in 3 phases: proactive support or primary prevention, also first stage intervention or the secondary prevention, and lastly the tertiary stage when the ongoing support for recovery is mainly necessary. The athlete should be trained and able to access these types of techniques whenever needed (McCromick et al., 2018).

A study by Couture et al. (1999) compared the performance of two mental training strategies over 10 training sessions. The study involved police officers who performed target shooting after an endurance march. The results indicated an improvement in relaxation, concentration, awareness and control, demonstrating that cognitive strategies can optimize performance in precision activities even after endurance efforts (Couture et al., 1999).

Also, for the authors Ytterbøl et al. (2023), the educational component of the shooting sports technique course requires the integration of goal setting skills, imagery, breath control, positive self-talk, affirmation and relaxation. They found that a mental skills training program positively influenced both the results and the performance of snipers from the Norwegian Armed Forces.

In the context of sport shooting, where each shot is the result of a succession of fine psychological processes, mental visualization techniques have proven to be among the most effective tools for psychological preparation. These techniques not only support the process of concentration but actively contribute to the automation of cognitive and emotional responses, preparing the athlete to react coherently, consistently, and with control under competitive pressure (Ytterbøl et al., 2023). Visualization is not a mere “imagining” of the bullet’s trajectory, but a complex mental exercise through which the athlete anticipates, step by step, the precise sequence of actions—from body positioning and breath control to trigger execution and post-shot evaluation.

By mentally repeating this ideal sequence, the athlete enhances their ability to maintain focus on specific, actionable steps rather than the final result or fears related to failure. Visualization thus becomes an internal mechanism for regulating psychological pressure, reducing the tendency toward rumination or the emergence of dysfunctional thoughts during critical competition moments (Haryanto et al., 2021). The effectiveness of this training lies in the athlete’s ability to anchor attention in the present, guided by two essential questions: “Where am I?” and “What is the purpose of my presence here?” These simple yet profound questions help reorient the athlete’s mental state toward conscious and

intentional presence, enabling them to block out distractions or external pressure.

By activating this form of strategic awareness, the athlete learns not to identify with negative thoughts or disruptive emotions, but to observe them and let them pass without granting them power. Each shot thus becomes the product of a trained, controlled, and deliberate mental state. In this sense, mental training—particularly through visualization—is no longer a complement to physical training, but an essential condition for performance, without which excellence in sport shooting becomes highly unlikely.

Discussions

Scientific knowledge brings value to sports professionals and institutions to implement and plan support interventions (Reyes-Bossio et al., 2022) provided by a psychologist for all those involved: athletes, coaches, parents, family.

The analysis conducted in this article clearly highlights that performance in sport shooting, unlike in disciplines where intense physical effort predominates, is profoundly influenced by psychological stability and the athlete’s ability to control their mental state in competitive contexts. Recent research in the specialized literature, along with practical observations from the high-performance sports environment, converge on the same conclusion: without systematic and sustained mental preparation, competition outcomes remain unpredictable and inconsistently aligned with the athlete’s true potential.

In sport shooting, each shot represents the culmination of a sequence of mental processes that require not only sustained attention but also a high capacity for emotional and cognitive self-regulation. Therefore, even the most refined technical training is not sufficient. The difference between an average athlete and an elite one often emerges at the mental level, where it is determined whether competitive pressure is channeled constructively or becomes a debilitating obstacle (Mladenović, 2019). Without professional support from a sport psychologist, such skills are difficult to develop, particularly among younger or less experienced athletes who lack effective self-regulation strategies. Mental visualization—one of the most frequently used techniques in psychological training—proves to be particularly valuable in

the context of sport shooting. It not only supports the process of concentration and motor sequence automation but also contributes to creating a psychologically safe space in which the athlete learns to reduce negative internal dialogue, redefine their focus, and regulate their activation level. The ability to mentally rehearse each step of the shooting process prior to execution has demonstrable positive effects on reducing anxiety, increasing self-confidence, and consolidating competitive routines.

However, the effectiveness of these techniques depends largely on the context in which they are implemented. The absence of sport psychologists in the technical teams of many sports structures represents a serious systemic issue that affects not only the individual preparation of athletes but also competitive equity at national and international levels. Athletes who benefit from the ongoing support of a sport psychology specialist are clearly better equipped to cope with pressure, maintain composure at critical moments, and deliver consistently high performance (Yudho, Hartono, & Sumartiningsih, 2022). In contrast, those without access to such support are forced to independently manage complex psychological challenges, which can lead to stagnation, withdrawal from sport, or chronic underperformance.

Moreover, although some coaches—particularly from newer generations—show greater openness to mental training techniques, limited resources and a lack of specialized education often render their efforts insufficient. As a result, the responsibility for psychological support falls on individuals who, although well-intentioned, lack the expertise necessary to effectively navigate the emotional and cognitive complexity of high-level performance.

In this context, it becomes evident that the development and professionalization of support teams, through the mandatory inclusion of sport psychologists in technical structures, represents not only a modernization measure but a fundamental requirement for achieving sustainable and ethical performance. Furthermore, such a shift would significantly contribute to equalizing development opportunities among athletes, by reducing disparities created by unequal access to psychological resources.

In conclusion, the data discussed here unequivocally support the necessity for sport shooting—and high-performance sport in general—to adopt mental training as a core pillar of preparation. Visualization, emotional self-regulation, and sustained concentration cannot be left to chance or managed informally; they must be trained, assessed, and continuously refined under the guidance of specialists. Only in this way can performance become reproducible, and athletes compete not only with precision but also with true psychological confidence and balance.

Conclusions

The theoretical data and arguments presented in this article clearly emphasize that mental training can no longer be regarded as an auxiliary aspect of performance sport preparation but must be integrated as a central element in the development of sustainable high-level performance. Sport shooting, due to its static yet psychologically demanding nature, offers a powerful example of how significantly mental factors influence the final outcome of competition.

In the absence of a structured psychological training program, athletes remain exposed to major risks such as emotional blockages, loss of focus during critical moments, or fluctuations in self-confidence. Techniques such as mental visualization, when applied under the guidance of a sport psychologist, have the potential to build psychological stability, reduce competitive anxiety, and enhance emotional and cognitive regulation.

At the same time, this research reveals a problematic reality in sports performance: the lack of adequate funding and institutional strategies that would ensure the consistent inclusion of sport psychologists in technical teams. This gap not only limits the potential of athletes but also creates major inequalities between those who benefit from professional psychological support and those deprived of this essential component of preparation.

Conservative or "**old school**" training that does not consider the psychological needs of the athlete has been replaced in the last 2 decades, especially in the mainstream media for today's athlete there are a multitude of ways to inform and raise awareness of the factor of mental ability and training in the development of sports performance. Modern sports psychologists emphasize advanced strategies

such as biofeedback and neurofeedback, while encouraging the use of mindfulness and other techniques currently used in mental health.

We are in the beginning of the era that replaces traditional **training** with **modern sports training psychology**.

In the last two decades, the conservative or "old school" approach to sports training, which neglected the psychological aspects of the athlete, has been significantly replaced. Today, especially due to the wide access to information through the media, athletes are much more aware of the importance of mental skills and mental training in the development of sports performance.

Modern sports psychologists focus on advanced strategies, such as biofeedback and neurofeedback. They also encourage the integration of techniques used in general mental health, such as mindfulness, to optimize the performance and well-being of athletes.

In conclusion, achieving elite-level performance in mentally demanding sports such as shooting requires a fundamental rethinking of training paradigms, where the psychological dimension is not only acknowledged but fully valued through specialized, continuous, and individualized interventions. Only through an integrated, multidisciplinary, and equitable approach can performance sports evolve toward sustainability and genuine excellence.

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