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OPPORTUNITIES FOR CORRECTING PSYCHOSOMATIC STATES OF ELITE ATHLETES DURING PRE-COMPETITION ACTIVITIES USING OFF-TRAINING METHODS AND EXTRA-TRAINING MEANS

Actuality. *Elite athletes in individual sports often face psychosomatic challenges during pre-competition activities, including stress, anxiety, and emotional tension, which negatively affect motor control, coordination, and overall performance. The increasing demands for mental resilience highlight the importance of supplementary interventions to stabilize athletes' psychological and physical states.*

Aim of the study. *To evaluate the potential of off-training methods in correcting psychosomatic conditions and enhancing pre-competition readiness in elit athletes.*

Materials and Methods. *This paper adopts a conceptual synthesis and critical review methodology, integrating interdisciplinary research with the authors' long-term field experience (1979–2025) in elite sports preparation.*

Conceptual model and intervention protocols. *Effective strategies include breathing techniques, meditation, biofeedback, and mobilization exercises that foster positive emotional states, reduce anxiety, and improve functional readiness. The study highlights structured application of pre-competition, pre-start, and recovery interventions to stabilize mental and physical states. Pre-competition activity represents an integral part of both stimulating and restorative systems, incorporating specialized means. According to current views, pre-competition states act as stimuli that activate the central nervous system (CNS).*

Conclusions. *Individualized use of supplementary off-training methods can enhance psychological resilience, motor stability, and urgent adaptation in elite athletes, supporting both performance and health. Further testing of these methods in controlled and competitive environments is recommended.*

Key words: *psychosomatics in sports, adaptation, resilience, pre-competition, off-training methods.*

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МОЖЛИВОСТІ КОРЕКЦІЇ ПСИХОСОМАТИЧНИХ СТАНІВ СПОРТСМЕНІВ ВИСОКОЇ КВАЛІФІКАЦІЇ У ПРОЦЕСІ ПЕРЕДЗМАГАЛЬНОЇ ДІЯЛЬНОСТІ ІЗ ЗАСТОСУВАННЯМ ПОЗАТРЕНУВАЛЬНИХ МЕТОДІВ ТА ЕКСТРАТРЕНУВАЛЬНИХ ЗАСОБІВ

Актуальність. *Спортсмени високої кваліфікації у індивідуальних видах спорту часто стикаються з психосоматичними викликами під час передзмагальної діяльності, зокрема зі стресом, тривожністю та емоційною напругою, що негативно впливають на моторний контроль, координацію та загальну результативність. Зростаючі вимоги до ментальної стійкості підкреслюють важливість додаткових утручань для стабілізації психологічного та фізичного стану атлетів.*

Мета дослідження *– теоретико-методологічне обґрунтування та розроблення інтегрованої концептуальної моделі корекції психосоматичних станів кваліфікованих спортсменів під час передзмагальної діяльності.*

Матеріал і методи*. Методологія роботи базується на концептуальному синтезі та критичному огляді літератури; вона інтегрує міждисциплінарні дослідження з багаторічним практичним досвідом авторів (1979–2025 рр.) у сфері підготовки спортсменів високої кваліфікації.*

***Концептуальна модель та протоколи втручань**. До ефективних стратегій належать дихальні техніки, медитація, біологічний зворотний зв'язок та мобілізаційні вправи, які сприяють формуванню позитивних емоційних станів, зниженню тривожності та покращанню функціональної готовності. У дослідженні наголошується на структурованому застосуванні передзмагальних, передстартових та відновлювальних утручань для стабілізації ментального та фізичного станів. Передзмагальна діяльність є невід'ємною частиною як стимулюючих, так і відновлювальних систем, що включають спеціалізовані засоби. Згідно із сучасними поглядами, передзмагальні стани виступають як подразники, що активують центральну нервову систему (ЦНС).*

***Висновок.** Індивідуалізоване використання додаткових позатренувальних методів може підвищити психологічну стійкість, моторну стабільність та термінову адаптацію спортсменів високої кваліфікації, сприяючи як результативності, так і збереженню здоров'я. Рекомендовано подальше тестування цих методів у контрольованих та змагальних умовах.*

***Ключові слова:** психосоматика у спорті, адаптація, резильєнтність, передзмагальна підготовка, позатренувальні методи.*

Introduction. Certain aspects of mental health difficulties among athletes are unique and raise considerable concern. Early professionalization in sports, a lack of knowledge and resources related to mental health, and the influence of technology are just a few contributing factors (Reardon, 2023). In some cases, these difficulties stem from negative consequences of prior competitive experiences, which may lead to psycho-emotional disturbances during training and subsequent competition, including the impact of COVID-19 infection.

The negative psychological effects manifest in various ways: feelings of depression (52%); lack of motivation to remain active (55%); excessive carbohydrate consumption (76%); disrupted sleep patterns (79%); increased demand for psychological services; disturbances in training and dietary routines; fluctuations in physical activity levels; social isolation; and family-related complications (Dagnall et al., 2021).

This review of the existing literature identifies and examines the factors underlying the relevance of studying psychosomatic conditions in elite athletes during pre-competitive and pre-start phases of activity. Special attention is given to psychological resilience, pre-competition stress, anxiety, and psycho-emotional strain, as well as: off-training methods aimed at correcting the psycho-emotional and physical state of athletes during pre-competition, pre-start, and recovery stages.

The influence of psychosomatic factors on competition outcomes is well established: such factors may lead to physiological changes – such as sleep disturbances, altered heart rhythm, and digestive disorders – that reduce performance and athletic effectiveness. Under competitive conditions, for example, athletes' responses often determine the extent of their success (or lack thereof), and these responses largely depend on their psychological characteristics (Gould, Dieffenbach & Moffett 2002).

Mental toughness (MT) is one of these characteristics and is frequently regarded as a critical determinant of success due to its role in fostering adaptive responses to both positively and negatively perceived factors, situations, and events. Research indicates that athletes with high levels of MT are more likely to compete at elite levels and achieve superior outcomes. It has also been suggested that mentally tough athletes tend to be more successful overall (Sheard et al., 2009; Gerber et al., 2013; Coulter et al., 2016). MT is further associated with higher competitive standards and greater achievements. Quantitative reviews of MT in the sports literature support this perspective, although current research is limited by cross-sectoral methodologies, inconsistent definitions of athlete groups, neglect of performance-related factors (e.g., physical abilities), and reliance on markers of success lacking sufficient sensitivity and specificity. These issues should be addressed in future studies to generate more precise conclusions about MT as one of the most significant psychological attributes influencing athletic success (Cowden, 2017).

MT is also conceptualized as a resilience resource related to overcoming adversity (Nicholls et al., 2012), synonymous with stress tolerance and optimal performance (Loehr, 1986, 1994). However, individuals with high psychological resilience may also exhibit socially undesirable traits (e.g., ruthlessness, selfishness), particularly when pursuing their goals (Sabouri et al., 2016). Elements of mental toughness associated with the «dark triad» traits (psychopathy, narcissism, Machiavellianism) can negatively affect psychological well-being. Athletes in individual sports are more likely to report dark triad traits compared to those in team sports. Evidence suggests that these traits may affect performance even at the professional level. Therefore, personality traits of both coach and athlete should be considered early in their relationship. For example, pairing an athlete with high narcissism with a coach possessing similar – but less pronounced – traits may foster positive working dynamics (Healy & Stanford, 2024).

Optimism is considered a relatively stable construct. The development of MT is primarily guided by the principles of positive psychology, enabling athletes to achieve optimal psychological functioning both in sports and in everyday life (Golby & Wood, 2016).

Although many definitions of Mental Toughness (MT) have been proposed in various contexts, a substan-

tial understanding of the concept is still lacking. Sometimes, it is assumed that MT is the ability to positively adapt to life conditions, a dynamic process that evolves over time, implying a type of adaptive functioning that allows overcoming difficulties by recovering and activating one's own resources after an unfavorable state, as an opportunity for growth and maintaining one's existential goals orientation (Sisto et al., 2019).

Pre-competitive stress, anxiety, and psycho-emotional tension can lead to physiological changes (sleep disorders, heart rate changes, digestive disturbances), which reduce an athlete's performance and effectiveness.

Literature presents methods to prevent or reduce the impact of negative psychosomatic factors on athletes' health, including breathing techniques, cognitive-behavioral therapy, mental training, biofeedback methods, etc. The combination of stress factors, typical in a sports context, and the sensitive stage of development through which elite athletes pass during peak performance can increase their vulnerability and worsen their mental state. It is considered essential to teach stress-coping skills and familiarize athletes with recognizing, evaluating, and formulating potential health risks. It has been shown that overcoming stress effectively restrains it, but the relationship between the stressor, its evaluation, the application of an appropriate coping strategy, and its effect on mental health outcomes remains unclear. Strategies for systematic reviews and meta-analyses are insufficient, and the possibility of interventions in elite sports conditions is very complex (Nuetzel, 2023).

Studies in sports are indicative, where results manifest as a multifactorial phenomenon dependent on both physical and mental factors. Somatic anxiety includes symptoms such as increased blood pressure and breathing rate, sweating, nausea, muscle tension, shaking, tension in various parts of the body, wet hands, dry mouth, the need to urinate, loss of appetite, and diarrhea. Research on self-efficacy, cognitive anxiety and somatic anxiety provides fundamental information to early identify weak areas in the training of athletes and to implement actions that contribute to the improvement and maintenance of sporting activities (Mercader-Rubio et al., 2023). Accepting anxiety symptoms as a natural part of the competitive experience is fundamentally important so that they can contribute to improved performance. Significant differences have been identified between athletes in different dancesport categories in terms of years of experience, readiness perception, cognitive anxiety, and self-confidence. Optimal levels for good performance are identified as cognitive anxiety, somatic anxiety, and self-confidence. Instead of fighting the symptoms of anxiety or trying to eliminate them, it is important for athletes to learn to manage and direct anxiety positively. Differences in athlete qualifications were confirmed, where elite athletes demonstrated greater experience, lower cognitive anxiety, and higher self-confidence compared to less qualified athletes. Practical application includes psychological training to strengthen emotional control in pre-competitive preparation, which can contribute to the maximum enhancement of performance, especially at advanced competition levels (Aliberti et al., 2024).

In several studies, athletes' perceptions of uncontrollable stress have been shown to correlate positively with assessments of various threat-related factors – such as unpleasant emotions prior to competition and pre-competition self-control strategies oriented toward distraction. Pre-competition evaluations of self-regulation and the ability to manage others in stressful situations were associated with relational factors and task-focused engagement during performance. Task-oriented coping strategies were positively linked with higher levels of subjective competitive performance. These findings support the view that stress appraisal, emotional responses, and coping mechanisms represent interdependent constructs, which in turn are closely tied to satisfaction with competitive performance (Nicholls et al., 2012).

Research has established that types of pre-competition anxiety in young athletes can be considered psychophysiological states arising from the anticipation of competition. This anticipatory stress necessitates the development of athletes' self-regulation, stress resistance, resilience, and skill, shaped by individual-typological characteristics, experience, and expertise. Four forms of pre-competition anxiety have been identified: destructive anxiety disorder, personal pre-competition anxiety, situational pre-competition anxiety, and socially based insecure anxiety. Of these, destructive anxiety disorder is regarded as the most detrimental. Anxiety is understood as a complex phenomenon influenced by cognitive, affective, and motivational-regulatory domains. Future research aims to develop individualized profiles of anxiety in athletes, allowing for timely interventions and adjustments within educational and training processes (Popovych et al., 2024).

Breathing practices in pre-competition and pre-start preparation for the prevention of psychosomatic problems in athletes

Breathing-based interventions are increasingly considered an important component of off-pharmacological stress regulation strategies. In addition to their effects on autonomic balance, these practices may complement other integrative approaches aimed at improving emotional stability and functional recovery. Evidence from

studies on phytotherapeutic and holistic stress-protective interventions suggests that combined approaches targeting neurovegetative regulation can enhance the adaptive capacity of the organism under stress conditions (Gorchakova et al., 2024).

A wide range of breathing techniques has been documented. These include lower, middle, upper, and full-cycle breathing as part of yoga pranayama; Ujjayi breathing (exhalation accompanied by the sound «ha»); Bhramari breathing (exhalation resembling the buzzing of a bee); Bhastrika (rapid and vigorous shallow breaths); Simha Kriya (breathing with varying tongue positions and a 30-second breath hold); breath retention on inhalation or exhalation; diaphragmatic breathing (slow and deep); rhythmic counted breathing; the Wim Hof method; and the Tibetan tummo technique. Such practices should ideally be performed under the guidance of qualified specialists with sufficient expertise and authorization to ensure their safe and effective application in regulating athletes' psycho-emotional states during pre-competition preparation (Benson & Klipper, 2001; Fielding & Dawson, 2021).

Breathing practices influence both the autonomic nervous system and brain function, which may underlie their stress-reducing effects. Evidence suggests that effective breathing interventions enhance parasympathetic tone, thereby counteracting the heightened sympathetic activity typically associated with stress and anxiety. Breathing plays a unique role in the bidirectional relationship with stress and anxiety, where each can both shape and be shaped by altered breathing patterns.

While it is well established that breathing techniques can reduce stress, the extent to which these effects vary across populations, types of breathing practices, and implementation strategies remains less clear. Research highlights several key factors for maximizing benefits: avoiding exclusive reliance on rapid breathing or sessions shorter than five minutes; receiving initial instruction from a coach; maintaining repeated sessions; and engaging in long-term practice. Adherence to these principles may help optimize the stress-reducing potential of breathing interventions (Bentley et al., 2023).

Although breathing practices are becoming increasingly popular for their potential therapeutic benefits, a meta-analysis has shown that their effects on self-reported stress, anxiety, and depression are relatively small to moderate compared to control conditions without breathing interventions (Fincham et al., 2023).

In training the respiratory system of athletes prior to competition, two main approaches can be distinguished:

– Specialized respiratory exercise systems**:** aimed at increasing respiratory power, strengthening the respiratory muscles and improving their efficiency.

– Conscious modifications of breathing**:** introducing voluntary control of breathing under physical strain to increase lung capacity, enhance oxygen utilization, and maintain homeostatic stability during respiratory shifts.

Prior empirical research (Vinogradov, 2010) demonstrated the effectiveness of a three-week pre-competition training program using the Power Breath device. The protocol involved three sets of 30 inhalations with progressively increasing resistance, performed twice daily over a period of 15–20 days before competition.

Mental Training

Research on the contribution of mindfulness and interoceptive awareness to athletic performance remains limited. Studies have examined the relationship between:

– self-reported mental skills that contribute to athletic success (e.g., attention, technique,

error sensitivity, commitment, and achievement),

– states of mindfulness in physical activity (integration of mind and body) and mutual

perception.

Findings suggest that the link between body awareness and psychological factors contributing to success in sport is mediated by two dimensions of interoception: self-regulation and attentional control**.** Developing mindfulness may therefore enhance self-regulation and attentional control, which in turn can strengthen the cognitive skills essential for athletic achievement. Mental training should thus prioritize body awareness, attentional regulation, and self-regulation to improve the psychological competencies that underpin sports performance (Rogowska & Tataruch, 2024).

Biofeedback Methods in Competitive Practice

Recent research highlights the role of multimodal psychophysiological interventions that combine sensory stimulation and relaxation techniques. Programs incorporating audio-vibro-visual stimulation have been shown to improve psychological well-being and reduce indicators of stress and anxiety, suggesting that such integrative methods may serve as an additional tool for regulating psycho-emotional states in physically demanding contexts (Pozmohova, 2023).

The impact of digital technologies on the psycho-emotional states of elite athletes during pre-competition and competition is of considerable interest and is recognized as highly effective. Various biofeedback methods are employed for self-regulation:

– Electroencephalography (EEG) to monitor brain activity

– Electromyography (EMG) to track muscle tension

– Cardiovascular, thermometric, and electrodermal indicators for heart rate (HR) and blood pressure regulation

– Galvanic skin response (GSR) to measure changes in skin electrical activity, potentials, and resistance – closely related to emotional arousal

– Wearable sensors or patches (e.g., Gatorade Sweat Patches) to assess sweat loss, temperature, and hydration needs.

Any training method that induces sensations similar to those experienced in competition can be tested with athletes. For example, providing runners with real-time visual feedback on head positioning may facilitate the development of more effective perception and motor patterns. By focusing attention on specific aspects of rhythm – such as maintaining constant speed or adapting to terrain changes – runners may better regulate their effort, potentially improving performance outcomes. Different forms of visual feedback may have distinct effects on runners' attentional processes (Perrey, 2024).

It is also important to highlight the physical factor of competitive load. Elite athletes are known to reach peak performance under competitive conditions. This influences pre-competition activity of the autonomic nervous system (ANS), although the relationship between ANS activity and performance remains debated. Studies have examined the effects of various pre-competition situations on ANS function and the relationship between pre-competition ANS activity and performance among elite athletes in extreme sports. Electrocardiograms (ECGs) of 20 elite snowboarders were analyzed, showing that pre-competition ANS activity in athletes of extreme sports tends to become predominantly sympathetic as the competitive situation intensifies.

Sympathetic predominance – mobilization of the body for active performance, stress, and high load – has been found to correlate positively with competitive activity (Matsumura et al., 2021), while parasympathetic activity is more strongly associated with recovery processes. The dynamic interplay of these systems supports the body's adaptation to different pre-competition and competition conditions.

Preparation for major competitions requires not only physical readiness but also heightened adaptability, along with resilience in motor and psychomotor skills. Traditional pre-competition routines often rely on standard, repetitive training drills, which may lose their mobilizing effect over time due to adaptation and may limit the transfer of skills to real competition settings. Given the psychosomatic and psychomotor demands of competitive tasks, preparing athletes to meet these challenges can present considerable difficulties.

The approach we propose is noteworthy for its practical significance, validated through many years of the authors' experience, and its continuing novelty due to the unique application protocol across pre-competition, pre-start, and post-competition contexts. The main conceptual foundations are presented in this study, with particular emphasis on the notion of contextual interference (CI) and its specific influence on pre-competition and pre-start activities, as well as its transferability to competitive environments.

Contextual Interference and Variability of Practice

The effect of contextual interference (CI) was first described by Battig (1972) and became widely recognized following the motor learning study of Shea and Morgan (1979). CI refers to the phenomenon whereby performing tasks under changing and more complex conditions leads to a temporary decline in performance, but in the long term ensures better retention and transfer of motor skills. Current research continues to explore the relationship between CI and the variable practice hypothesis within Schmidt's schema theory, which suggests that variable practice contributes to the development of more effective motor schemas compared with constant practice (Schmidt, 1975; Van Rossum, 1990). In this regard, the search for practical recommendations clarifying the mechanisms of CI and its value for optimizing motor learning remains a pressing task (Magill & Hall, 1990).

Some findings indicate that allowing for intertask interference – situations where performing one task disrupts the performance of another not originally scheduled for practice – can enhance accessibility, execution, and memory of motor actions. By contrast, intratask processing (IP) – when different components of a single task interfere with one another during the early stages of learning – as well as blocked practice, exert limited influence on test performance and only modestly contribute to later skill retention (Wright, 1991).

According to the CI model, a high degree of random (non-sequential) practice, accompanied by substantial interference, produces lower performance during the acquisition phase but results in superior retention and transfer of motor skills compared with blocked practice, which is characterized by minimal interference. These regularities have been convincingly demonstrated in laboratory studies, though their practical applicability in sports remains debated (Ammar et al., 2023).

Analysis of practical experience (1979–2025) and data on the use of off-training methods in elite sports (1997–2025) emphasize the continued relevance of Battig's (1972) propositions. Specifically, the greater the degree of interference at the early stages of learning a specific task, the higher the level of skill retention in novel conditions. The authors' long-term practice of employing special off-training interventions at Euro-

pean Championships, World Championships, Olympic Games, and other major tournaments supports the empirical hypothesis of the positive impact of interference: although, during initial learning, different tasks or task components may hinder each other, in the long run such interference serves as a stimulus for stronger retention and more successful transfer of skills.

Variability of Practice and «Desirable Difficulties»

In developing the algorithm of off-training interventions, established principles of sports biomechanics, the concept of progression from verbal to motor learning, the model of variability of practice (VP), and Schmidt's schema theory were applied (Bongaardt & Meijer, 2000). In several sources, VP is regarded as one of the most widely used tools for enhancing motor learning efficiency. However, findings in the literature remain contradictory regarding its advantages compared with constant practice. It has been noted that VP becomes a key factor in optimizing motor learning when the training load is aligned with the learner's individual motor variability. Athletes with low levels of exploratory behavior gain the most benefit from moderate loads of variable practice (Caballero et al., 2024).

Contemporary perspectives link the use of variability of practice (VP) with the concept of «desirable difficulties», as described by Nuetzel (2023). Such difficulties are characterized as relevant to task performance, innovative, and potentially surmountable. They stimulate cognitive engagement and enhance the efficiency of subsequent learning. An important condition is the application of adaptive practice schedules, in which the level of task difficulty changes depending on the learner's prior successes. Equally significant is the treatment of errors: their discussion and independent interpretation by learners are viewed as resources for deeper skill acquisition (R. Bjork & E. Bjork, 2020). This may be regarded as one of the modern interpretations of the mechanism of interference.

Objective of the study. To evaluate the potential of off-training methods in correcting psychosomatic conditions and enhancing pre-competition readiness in elit athletes.

Material and methods. This study examines a conceptual and review-based methodology. A comprehensive literature search was executed across major electronic databases (PubMed, Scopus, Web of Science, Google Scholar) covering the period from 1975 to 2025. The following search terms and their combinations were used: «psychosomatics in sports», «pre-competition stress», «contextual interference», and «off-training methods». Sources were included if they addressed elite athletes in individual sports, pre-competition psycho-emotional states, or clearly described off-pharmacological interventions. The theoretical framework for the study integrated established principles from sports biomechanics, the progression from verbal to motor learning, and Schmidt's schema theory as well as incorporates modern concepts of bioelectronic medicine, which clarify the biophysical mechanisms for regulating the functional state of athletes (Filiunova et al., 2023).

Furthermore, the theoretical analysis is enriched by the critical synthesis of the authors' long-term field experience (1979–2025) in preparing elite athletes for Olympic Games and World Championships, serving as an empirical verification of the proposed conceptual framework.

Conceptual model and intervention protocols. This study summarized a previously developed algorithm for the application of special off-training interventions aimed at activating athletes' functional systems in pre-start and pre-competition contexts. The overall structure and progression of this system are schematically illustrated in fig.

The use of model-based exercises with a partner in resistant modes made it possible to reproduce key elements of competitive load and increase athletes' readiness for real competition. Parameters and protocols of implementation are detailed in (Vinogradov, 2010; Vynohradov et al., 2020, 2021).

These types of loading regimes improve intermuscular coordination, activate the motor cortex, and ensure more reliable execution of motor skills in competitive settings. Pre-competition activity is considered a multi-level process that forms the mobilization potential of the athlete. It represents an integral part of both stimulating and restorative systems, incorporating specialized means. According to current views, pre-competition states act as stimuli that activate the central nervous system (CNS). In response, the organism undergoes a functional reorganization: the brain analyzes arousal, forms motivation, and translates it into intention and action. As a result, motor traces (skills) and tactical combinations are retrieved from memory (Åstrand & Rodahl, 2003; Kenney, Wilmore & Costill, 2024).

Considering the psycho-emotional state of athletes revealed a certain modulation of the effect of contextual interference (CI) on motor activity. Including psycho-emotional indicators in the analysis made it possible to more accurately predict the variability of results under competitive stress. Athletes who performed special exercises with a partner during preparation before the competition and before the start demonstrated greater stability in performing motor skills compared to those who trained according to traditional protocols. This confirms the hypothesis that emotional regulation and interper-

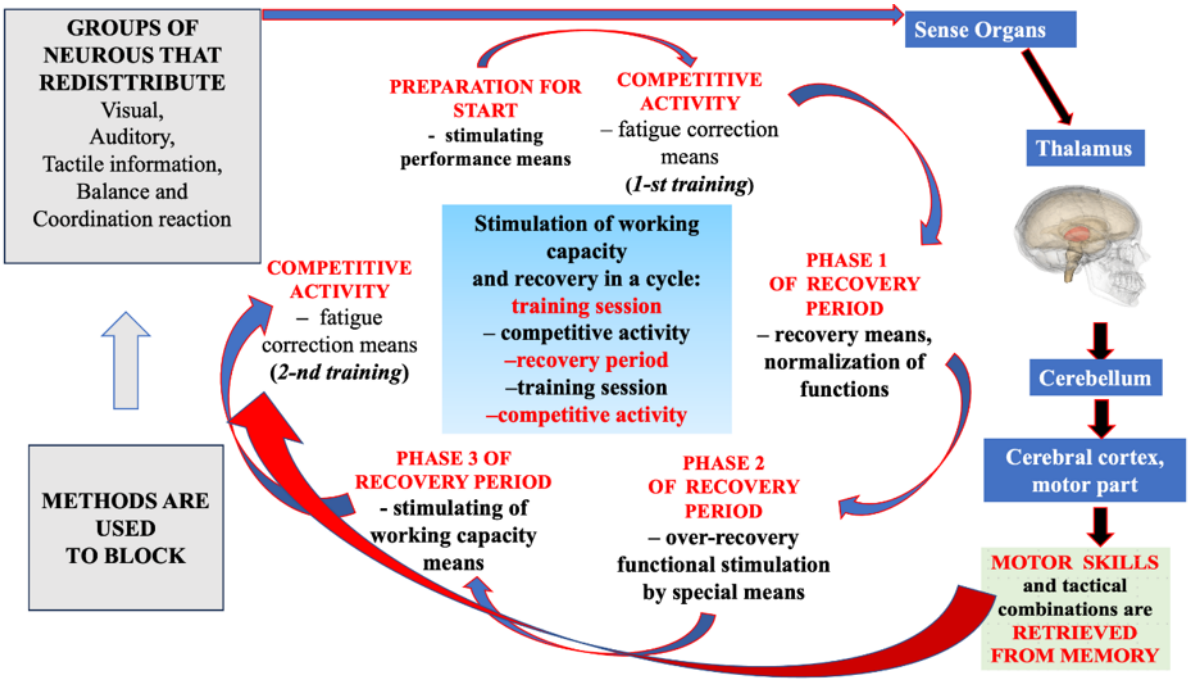

Fig. Schematic representation of the cycle of extra-training interventions during pre-competition and pre-start preparation of elite athletes

sonal interaction increase the reliability of skill reproduction under high pressure.

The specific characteristics of partner-based exercises largely determine the effectiveness of off-training interventions in pre-competition and pre-start practice.

Specific Requirements for Partner-Based Exercises:

– The need for special physical preparation and training of the partner to work with the athlete, considering the level of difficulty and variability of the exercises

– Consideration of the athlete's functional state

– Modeling by the partner of tempo, rhythm, amplitude, accuracy, and speed strength parameters (efforts) characteristic of competitive activity

– Use, during training, of sufficiently isolated muscle groups that will be engaged in the forthcoming competitive performance

– Activation of proprioceptive sensitivity and neurotransmitter mechanisms of impulse transmission under resistant exercise conditions

– Enhancement of the mobilization readiness of the nervous system

– Testing of exercise protocols at lower-level competitions in order to refine implementation procedures.

– Improvement of movement coordination and psychomotor performance in competitive activity

– Improvement of competitive results.

A detailed comparison of the applied complexes, specific techniques, and duration parameters is presented in Table. Both phases share general features, such as considering the athlete's physical, functional, and psycho-emotional state, using tested exercises, and involving a qualified partner.

The retention of skills at the level of an instinctive response to stimuli in our practice was supported, among other methods, using additional interventions that hypothetically activate the thalamus – namely, special exercises with blocked visual and auditory analyzers, as well as permissible adjustments to load intensity and corresponding recovery. The thalamus is known to function as the primary "switchboard" for sensory streams (vision, hearing, somatosensory information) (Paricio-Montesinos & Gründemann, 2025). Studies have demonstrated that sensory deprivation (closed eyes, restricted hearing) influences the reorganization of motor activity and enhances the role of proprioceptive signals (Kung et al., 2020).

Motor learning engages a widespread neural network, including the basal ganglia, cerebellum, motor cortex, and brainstem. Despite its importance, relatively little is known about how this network learns motor tasks or about the specific roles of its individual components. Researchers have concluded that the cortico-basal ganglia loop learns through motor prediction errors based on novelty to define specific actions leading to the desired outcome, while the cerebellum minimizes the residual error (Baladron et al., 2023).

Table

Differences and Similarities in the Use of Off-Training Methods During Pre-Competition and Pre-Start Preparation

Off-Training Methods	Pre-Competition Preparation	Pre-Start Preparation
General Features	Elements of acceptable novelty that do not irritate the athlete; consideration of physical, functional, and psycho-emotional state and reactivity; tested and adapted exercises; participation of a qualified partner; consideration of warm-up conditions, call room, and competition environment.	Same as pre-competition preparation.
Activation of Functional Systems	Breathing exercises (*cardio-respiratory system activated*); segmental massage (*sympatho-adrenal system activated*); partner-based exercises (*competitive effort modeling, motor skills activated*); cold and fascial massage (*capillaries activated*); kinesiotaping (*proprioceptors activated*).	Same as pre-competition preparation.
Developed Protocols	Basic complex, Passive-1, Pre-competition passive-active-2, Recovery complex.	Pre-start mobilization complex, Inter-start cooling complex, Special recovery protocols (including facial massage for rapid sleep induction).
Differences	**Pre-Competition Interventions:** - Classical sports massage (preliminary, pre-competition). - Special effect techniques: vibration (mechanical, acoustic – along muscles, sometimes vibration platform); applications (stones, compresses); reflexive methods (segmental, acupressure, pneumatic clubs, baro-, guasha); manual therapy elements (*Post-Isometric Relaxation – PIR*); electrostimulation; heating or cryotherapy (*hot/cold packs, ointments*); partner-based exercises in special regimes (isokinetic, eccentric, concentric).	**Pre-Start Interventions:** - Exercise complexes adapted by the partner according to the current neuromuscular state and psychomotor readiness of the athlete. Adjusted parameters include: movement speed, joint angles, levers of influence, torque of effort, both partner's and athlete's efforts.
Applied Complexes	Basic, Passive-1, Passive-Active-2, Recovery.	Passive-1, Pre-start Mobilization, Inter-start Cooling.
Duration & Parameters	Duration varies (6–15 minutes); 3–6 repetitions of each movement; effort duration 4–6 seconds; specificity strictly defined; physiological effects documented.	Same structure but tailored to immediate start readiness.
Advantages	- Reduces need for prolonged warm-up. - Lowers risk of injury. - Provides effective recovery between competitions.	Same advantages, with stronger focus on mobilization and readiness.

We hypothesize (see Figure 1) that during targeted sensory blocking (limiting auditory and visual afferentation, reducing vestibular stability), a redistribution of neural activity occurs within the brain's sensorimotor loops, including the thalamus, sensory cortical areas, cerebellum, basal ganglia, and motor cortex. Under conditions of reduced external sensory input, the central nervous system (CNS) amplifies the role of proprioceptive and motor programs stored in long-term memory, thereby facilitating the retrieval of previously established technical and tactical skills.

Requirements for psychological resilience, pre-competition stress, anxiety, and psycho-emotional tension were considered, as well as the role of extra-training interventions aimed at correcting the physical and psycho-emotional state of athletes during the pre-competition and pre-start phases of competitive activity.

Accounting for the athlete's psycho-emotional state makes it possible to model the positive effect of contextual interference (CI), which ensures higher reliability in the reproduction of motor skills under competitive conditions. The practical application of extra-training interventions in pre-competition and pre-start preparation improves the stability and reliability of competitive performance in the individual practice of elite athletes.

The proposed algorithm has a universal psycho-physiological framework but adapts to the specifics of various sports. For cyclic sports (e.g., track and field, rowing), the emphasis shifts to breathing techniques and heart rate recovery. In coordinate-complex sports and combat sports, primary importance is placed on sensory blocking protocols and partner-based exercises to stabilize motor control directly during the pre-start period.

Discussion. Training, extra-training interventions, biomedical support, nutrition, pharmacology, the involvement of a new psychologist or consultant with novel ideas, and other factors may provoke inadequate responses in elite athletes after application (whether psychogenic or physiological in nature).

It can be noted that pre-competition activity under conditions of sensory blocking may stimulate:

– activation of «reserves» of motor experience,

– increased stability of motor programs (movement technique),

– more effective integration of movement memory into competitive activity (retrieval from prior competitive experience).

The enhancement of motivation in this context is explained not only by neurophysiological mechanisms, but also by the psychophysiological factors of novelty and heightened attentional focus, which additionally strengthen the training effect.

The pre-competition cycle comprises three distinct phases prior to actual competitive performance:

– the pre-competition micro cycle,

– the day before the start,

– the immediate pre-start preparation.

In each of these phases, targeted interventions can be applied to correct the psychosomatic state of the athlete when necessary. Importantly, the intervention algorithm must first be tested in model competition settings during training, or in less critical competitions that are not the main events of the season.

A strategically important study can be highlighted, demonstrating the current state of support for mental health and well-being in elite athletes. The review identifies that existing development efforts are partly focused on building literacy in mental health issues or awareness of symptoms of psychological disorders among athletes. Of particular interest is an author-developed model of intervention that addresses the needs of athletes either at risk of developing, or already experiencing, mental health symptoms or disorders.

The model incorporates 11 essential components, among which the following are of greatest relevance for our context:

– identification of risk factors for mental illness in elite athletes,

– development of a comprehensive mental health framework to support elite athletes,

– regular mental health screening,

– targeted «at-risk» prevention programs,

– early intervention, among others.

According to the authors, elements of this system could in the future be adapted and contextualized for non-elite settings, where resources may be limited, there is fewer professional staff, and athlete schedules are more constrained (Purcell et al., 2019).

It should be noted that certain proposed neurophysiological mechanisms and assumptions regarding CNS activation are conceptual at this stage and require further empirical and experimental confirmation under controlled conditions.

Conclusions. The developed conceptual framework integrates off-training methods (breathing techniques, biofeedback) and psychomotor variability (contextual interference) into a structured paradigm for managing the psychosomatic states of elite athletes during pre-competition activities. Theoretical analysis suggests that the systematic application of these extra-training interventions has the potential to optimize pre-start emotional arousal and enhance motor skill adaptability under intense competitive stress. While the model is grounded in extensive practical coaching expertise (1979–2025), further empirical, well-controlled experimental studies are required to quantitatively evaluate and validate the precise efficacy of these protocols across diverse sports disciplines.

Limitations and Future Directions

1. The effect of training under conditions of sensory restriction (improved technique, reactions, coordination) requires further empirical validation. There is no direct neurophysiological evidence that sensory deprivation directly activates long-term motor memory or the «reserve of experience».

2. It remains unclear whether the motivational effects observed are primarily mediated by neural mechanisms or reflect a psychophysiological response to novelty and attentional focus.

3. Comparative studies are needed to determine whether this methodology provides a measurable advantage over standard preparation protocols for competition.

4. Criteria must be developed to assess and quantify deviations of an athlete's psycho-emotional state from their optimal behavioral model within pre-competition phase.

5. Algorithms for individualizing corrective interventions should be elaborated, with attention to all phases of pre-start preparation.

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