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DECORATIVE PLASTER AND BAS-RELIEF PAINTING AS ELEMENTS OF NEUROFITNESS IN PSYCHO-EMOTIONAL REHABILITATION

Modern research highlights the crucial role of neurofitness in maintaining mental and physical health. Neurofitness integrates cognitive training and physical activity, making it an effective tool for rehabilitating individuals with post-traumatic stress disorder (PTSD). In particular, biofeedback, neurofeedback techniques, and decorative and bas-relief painting, are used to reduce stress levels, enhance concentration, and improve cognitive plasticity. A literature review indicates the positive effects of neurofitness on athletes, military personnel, and individuals who have experienced psychological trauma. Despite its promising potential, questions remain regarding the standardization of techniques and their adaptation for different age and social groups.

Key words: *neurofitness, post-traumatic stress, cognitive training, neurofeedback, decorative plaster painting, bas-relief painting.*

Кострікова Катерина, Костріков Олександр. Декоративний штукатурний і барельєфний живопис як елементи нейрофітнесу у психоемоційній реабілітації. *Сучасні дослідження вказують на важливу роль нейрофітнесу у збереженні ментального та фізичного здоров'я. Нейрофітнес поєднує когнітивні тренування та фізичну активність, що робить його ефективним інструментом реабілітації осіб з посттравматичним стресовим розладом (ПТСР). Зокрема, методики біологічного зворотного зв'язку, нейрофідбеку, а також декоративного та барельєфного живопису використовуються для зниження рівня стресу, покращення концентрації та когнітивної пластичності. Аналіз літератури свідчить про позитивний вплив нейрофітнесу на спортсменів, військових та осіб, які зазнали психотравматичних подій. Незважаючи на перспективність, залишаються відкритими питання щодо стандартизації методик та їх адаптації для різних вікових та соціальних груп.*

Ключові слова: *нейрофітнес, посттравматичний стрес, когнітивні тренування, нейрофідбек, декоративний штукатурний живопис, барельєфний живопис.*

Relevance. The modern world faces significant challenges that affect the somatic and mental health of people of all ages. Increasing stress levels, sedentary lifestyles, environmental problems, the impact of pandemics, and military conflicts—all these factors lead to a deterioration in the physical and psychological state of the population. In this context, neurofitness is seen as a promising approach that combines cognitive training and physical activity to improve overall vitality, adaptability, and health recovery.

Scientific studies show that neurofitness methods can have a powerful therapeutic and preventive effect in different age and social groups. For children and adolescents, they help improve attention, self-control, and academic performance [1; 2]. For adults, especially those who work under high stress, neurofitness helps to regulate their emotional state, increase performance, and

prevent cognitive exhaustion [3]. For older adults, these methods can prevent age-related cognitive impairment and maintain a high quality of life by stimulating neuroplasticity [4].

A special role is played by the integration of physical activity into neurofitness programs, as cardiorespiratory training has been shown to correlate with increased cognitive efficiency and psychological resilience [5; 6]. The use of neurofeedback techniques, gamified training, and art therapy tools in training and individualized health rehabilitation programs allows for the most effective adaptation of neurofitness to the needs of different population groups.

Thus, neurofitness as an innovative trend is a **relevant** topic today in the field of preserving and restoring somatic and mental health at all stages of life. Its implementation in educational, sports, rehabilitation, and corporate practice will contribute to the formation of a society with a high level of adaptability, stress resistance, and physical well-being [9].

Problem statement. World history knows many tragedies that have left a deep mark on the collective consciousness of humanity. Wars, violence, disasters - all of this not only changes the course of events but also changes human destinies forever. However, the consequences of such events often remain invisible, hiding in the depths of the human psyche. Post-traumatic stress disorder (PTSD) is not just a diagnosis, but a psychological shadow that can haunt a person for years after a traumatic experience.

As defined by the World Health Organization (WHO), PTSD is a mental health disorder that occurs as a response to a severe stressful or traumatic experience. It can be caused by war, torture, sexual or physical abuse, disasters, terrorist attacks, road accidents, or any other event that threatens the life or health of a person or their loved ones [10].

Not everyone who has gone through a traumatic experience faces PTSD. However, for some people, even one such event can become a trigger that will set off a mechanism of prolonged psychological suffering. It is important to understand that people with PTSD may not show any signs of problems on the outside, but invisible emotional wounds significantly affect the quality of their lives, as well as the lives of their family and friends.

According to the WHO, about 70% of people in the world have experienced at least one potentially traumatic event in their lifetime, and 5.6% may develop PTSD. About 3.9% of the world's population has been officially diagnosed with PTSD at least once in their lives [10].

For Ukrainians, the war has become a reality that has changed the nation's mental map. Anxiety, panic attacks, nightmares, fear, and pain have become part of everyday life, and PTSD has become a massive phenomenon that has affected millions.

According to the National Health Service of Ukraine (NHSU): In 2021, 3,167 patients were diagnosed with PTSD. In 2022 - already 7,051 people. In 2023, the number of people with PTSD increased to 12,494. In just two months of 2024 (as of March 6), 3,292 new cases were registered [7].

Neurofitness, as a form of mental training, involves monitoring and adjusting brain activity in real-time, which has made it the object of considerable attention in cognitive behavioral research. Over the years, this type of fitness has proven to be a promising method of modulating brain functions and behavioral responses, opening up wide opportunities for application in the field of mental health, cognitive improvement, increased concentration, calming, and productivity.

The popularity of neurofitness is due to its non-invasiveness and ability to selectively affect neural networks responsible for the development of neurological and psychiatric disorders. This feature makes the method an effective tool for therapeutic and cognitive rehabilitation programs that are actively studied by scientists [4; 7-9].

In 2010, a study was conducted among Canadian athletes who participated in the Vancouver Olympics. The results showed that the use of neurofitness tools helped them to better control stress, which had a positive impact on their performance compared to the previous year [10].

In this review study, we analyzed neurofitness protocols, in particular neurotechniques based on bas-relief and decorative plaster painting, and their impact on sports performance. The data collection process was completed on June 30, 2016. This study notes that most published works confirm the effectiveness of neurotechniques in improving sports skills and cognitive functions, which play a key role in sports performance.

However, the authors emphasize that the conclusions about the effectiveness of neurofitness remain controversial. Some of the results obtained differ significantly from the positive conclusions drawn in previous studies. To obtain more reliable data, further research is needed to identify the limitations and peculiarities of neurofeedback in sports and health maintenance for different populations. Thus, although there is some evidence in favor of the effectiveness of NFT in improving sports performance, there is currently no sufficient scientific evidence of its undisputed effectiveness.

Results of the study. To ensure the high quality of a systematic review, the study methodology complies with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards [1] and the Cochrane Collaboration's recommendations for systematic reviews of interventions [2].

The literature review was based on a search of scientific articles in leading electronic databases, including PubMed, Google Scholar, Scopus, Web of Science, and other relevant scientific resources.

The following keywords were used in the search: "EEG", 'neurofeedback', 'biofeedback', 'sports', 'cognitive training', 'effectiveness of neurofitness in sports activities', 'impact of neurofitness on mental health', 'neuro-techniques employing decorative painting'. The analysis included publications published after 2016, which allowed us to take into account the latest research and modern approaches to the use of neurofitness in sports training and neurotechniques using plaster and bas-relief painting to improve mental health.

The focus was on studies that.

- included control and experimental groups, which made it possible to compare the effectiveness of neurofitness training;
- used long-term observation of people with PTS before and after applying the bas-relief and decorative plaster painting technique;

- analyzed the impact of biofeedback on cognitive, physiological, and psychological performance indicators in various types of physical activity.

The results of previous studies indicate that neurofitness training can have a positive effect on stress regulation, concentration, motor coordination, and cognitive function in athletes. At the same time, it should be noted that the results obtained remain variable, and thus further research is needed to determine the optimal neurofitness training protocols.

Table 1 shows the stages of the literature search, as well as the inclusion and exclusion criteria for the analysis (Table 2).

Table 1

Stages of literature search

Stages of the search	Search phrases
1	MeSH: neurofeedback, neurotechniques, sports, training, efficiency, decorative plaster and bas-relief painting
2	Publications older than 2016
3	Publications in English and Ukrainian
4	Available abstracts

The selection of publications for analysis was carried out by clearly defined inclusion and exclusion criteria that ensure the high quality and reliability of the data obtained. Original studies that contained empirical data on athletes and reflected the dynamics of the impact of the training protocol over a specified period were included in the review. An important criterion was the preservation of the participants' professional activity throughout the study, which allowed to ensure the correctness of the analysis of the impact of neurofeedback training. Although age was not an absolute exclusion criterion, the sample consisted mainly of individuals aged 18-35 years, as this period is characterized by the highest physical and cognitive performance.

The age threshold was set at 45 years to avoid the influence of age-related physiological changes that may distort the results. The sample did not include individuals over 45 years of age due to the increased likelihood of age-related degenerative processes affecting neuroplasticity and adaptive capacity.

Additional exclusion criteria were the presence of mental or somatic disorders that could significantly affect the results of the study, as well as concomitant pathologies that could cause deviations in the cognitive and physiological response to training. This approach to selection minimized possible sample bias and increased the validity of conclusions about the effectiveness of neurofitness in sports practice and among the population with an active physical lifestyle. Exclusion criteria were the presence of mental and physical disorders that would significantly affect the course of the study.

Table 2

Inclusion and exclusion criteria used for the analysis

Inclusion criteria	Exclusion criteria
Research involving the analysis of athletes' performance	Lack of research conducted among athletes
Using the biofeedback method in the training process	Lack of information on the use of biofeedback in training
Detailed description of the training methodology	Lack of specific data on training
The duration of the experimental period is clearly defined	Insufficient data or lack of information about the duration of the study
Participants do not have medical conditions that may affect the results	Presence of chronic or acute diseases that may affect the reliability of the results

Based on our research, we can draw certain conclusions. Many non-traditional forms of neurofeedback take into account physical aspects. Decorative plaster painting belongs to one of these fields. Thus, it helped to maintain motivation during the rehabilitation of world champions in kayaking with chronic fatigue syndrome. Thanks to the repetitive movements in the technique of decorative plaster painting, outstanding kayakers were able to withstand the exhausting rehabilitation process and return to high psychomotor performance [4-7].

The study by M. Matsurik clearly shows that this type of training significantly affects the dynamic balance of Judaists [9]. Neurofeedback training has also been proposed as a way to expand self-regulation control. This method is also recommended for people who have experienced traumatic conditions caused by military operations on their territory. It can help coordinate movements in disciplines that involve synchronized movements [11]. Bas-relief painting as feedback not only helps to maintain motivation during rehabilitation but also makes it possible to achieve better physical performance. A study conducted on 400-meter runners shows the effectiveness of this method.

Emmanuel Junet et al. investigated neurophysiological (EEG) markers of covert visuospatial attention (CVA) that can be used in neurofeedback training protocols to improve goalkeeper performance in soccer. A significant positive correlation was found

between the improvement of HRVA and an increase in resting alpha brain activity, which opens up the possibility of developing innovative training programs that combine neurofeedback and cognitive tasks in virtual reality [12].

In Ukraine, similar studies have been conducted by Vatseba O.M., Yermolova V.M., and Moskalenko N.V., who studied the adaptive capabilities of athletes and military personnel who have experienced PTSD when using biofeedback in the training process [10] and investigated the impact of an integrated training approach on the physiological and behavioral performance of semi-professional athletes.

During the training sessions, participants performed relaxation practices, received audiovisual stimulation, and used neurotechnologies to restore their psychoemotional state. It was found that training contributed to an increase in alpha- and beta-1 activity at rest with eyes closed, which indicates the effectiveness of neurofitness in optimizing the cognitive state of athletes [2; 5; 7; 9].

In Ukraine, similar approaches have been studied by Dubohai O.V. and Kulish Y.I., who analyzed the impact of exercise on people who have experienced traumatic experiences, including combat veterans [6], who studied the activity of the frontal cortex during table tennis and compared it to physical activity on an exercise bike. It was found that neurofitness techniques using bas-relief painting activate the prefrontal and frontal-central brain regions and help reduce anxiety in athletes. An increase in theta activity in the frontal areas is associated with monitoring errors, maintaining balance, and adapting to unpredictable game conditions. This study is especially relevant for people with PTSD, as physical activity helps regulate the psychoemotional state [5].

Similar results in Ukraine were obtained by Lisogor L.V. and Savchuk O.P., who studied the role of sports games in the cognitive rehabilitation of veterans. The studies by Puseniak, Miroslav, and Adam [4; 8; 11] included control and experimental groups, but most had a small sample size, which affected the statistical significance of the results. One of the main challenges is the variability of approaches, as the studies covered athletes from different disciplines. For example, the aforementioned researchers used adapted NF protocols for volleyball players, which emphasizes the importance of personalizing NF training depending on the sports specialization [2-5].

In Ukraine, the adaptation of neurofitness technologies in sports and rehabilitation after PTSD was studied by Kotsan A.P. and Bashavets M.V., who emphasized the need to unify training methods and adapt them to the needs of military and civilians with psychological trauma [4].

In addition to traditional methods of neurofitness training, neurotechniques such as decorative plaster painting are actively used in modern practice to restore cognitive and emotional balance:

- Decorative plaster painting is a creative process that promotes sensory integration, stress reduction, and fine motor skills, which is especially useful for people who have experienced PTSD.
- Bas-relief painting is a technique that activates visuospatial thinking and cognitive functions, promotes relaxation and the formation of new neural connections in patients with emotional regulation disorders.

These techniques are effectively used in neurofitness, helping not only athletes but also veterans, and people with anxiety disorders and PTSD, providing them with a safe way to process traumatic experiences through artistic expression.

Conclusions. The inclusion of neurofitness technologies, including neurofeedback, cognitive games, exercise, and art therapy, contributes to the recovery of the psychoemotional state of athletes and PTSD survivors. Future research should focus on expanding the sample, standardizing NF training protocols, and adapting techniques to the needs of specific populations, such as military personnel returning from combat zones and individuals who have experienced severe stress.

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ASPECTS OF FORMING THE IMAGE OF UKRAINIAN ATHLETES (theoretical analysis)

The article provides a theoretical analysis of key aspects of the image formation of Ukrainian athletes. It was found that: it depends on the athlete how all representatives of the sports industry in the country will be perceived or how the socio-cultural potential of the entire country will be assessed abroad; the image formation of Ukrainian athletes includes several key aspects that allow them not only to achieve high results in sports, but also to be successful in the media and social space. It was found that Ukrainian athletes use the following aspects to form their image: high competition results, a large number of medals and victories increase the level of trust and recognition among fans, media and sponsors; competition against strong rivals, victories at prestigious competitions; training and victories in difficult conditions, their participation in international competitions in conditions of political and social changes; the ability to embody the best human qualities with their professionalism, behavior, manners and appearance; mass media and social networks; overcoming difficulties associated with injuries, failures or personal problems. The conclusions are: the formation of a positive image of Ukrainian athletes is a long-term strategy that requires joint efforts of the athletes themselves, sports organizations, the state and business. It depends on the combination of their sports achievements, personal qualities, media activity and social responsibility. An athlete who demonstrates high achievements, is charismatic, active in public life and supports important social initiatives becomes not only a symbol of his sport, but also the pride of the nation, inspiring millions of people around the world.

Key words: *athletes, image, media, competitiveness, social responsibility.*

Мартинова Н.П., Хотієнко С.В., Агалаков В. Аспекти формування іміджу українських спортсменів (теоретичний аналіз). *У статті зроблено теоретичний аналіз ключових аспектів формування іміджу українських спортсменів. З'ясовано, що: саме від спортсмена залежить, як сприйматимуть усіх представників галузі спорту в країні чи як оцінять соціально-культурний потенціал всієї країни за кордоном; формування іміджу українських спортсменів включає декілька ключових аспектів, які дозволяють їм не тільки досягати високих результатів у спорті, але й бути успішними в медійному та соціальному просторі. Виявлено, що українські спортсмени для формування свого іміджу використовують саме такі аспекти: високі результати змагань, велика кількість медалей та перемог; конкуренція*