THEORY AND IMPROVEMENT OF PSYCHOLOGY

THE USE OF ARTIFICIAL INTELLIGENCE IN DEVELOPING AUTOGENIC TRAINING FOR PSYCHOPHYSIOLOGICAL STATE CORRECTION IN HIGH-RISK PROFESSIONALS TO PREVENT FUNCTIONAL IMPAIRMENTS

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Abstract. The aim of the article is to assess the potential for implementing AI tools in the development of autogenic training programs aimed at correcting the psychophysical state of high-risk professionals prone to disorders leading to functional impairments. Research findings indicate that high-risk professions are associated with stress, high demands, and hazards that contribute to the development of psychophysical disorders, such as burnout and emotional exhaustion. Autogenic training is an effective self-regulation method that reduces stress and enhances overall well-being, becoming a key element in the prevention of burnout and emotional exhaustion. AI can be utilized to create personalized applications that provide interactive effects for sensations of warmth and heaviness, recording and playback of personalized affirmations, audio-visual effects to create a sensation of coolness, audio guides for the sensation of gravity, tools for deep relaxation, and musical accompaniments for music therapy.

Key words: autogenic training, psychophysical disorders, high-risk professions, applications, artificial intelligence, correction programs.

Introduction. In the fast-paced modern world, professions with a high level of risk are often associated with demanding requirements and stressful situations, which can lead to various psychophysical disorders. Stress, emotional exhaustion, burnout, anxiety, and depressive disorders are becoming increasingly common among professionals such as healthcare workers, educators, emergency responders, and military personnel. These conditions not only deteriorate the quality of life of individuals but can also significantly impact their professional efficiency, posing a threat to their health and safety.

In this context, the search for effective methods of correction and prevention of psychophysical disorders is extremely relevant. One promising direction in this field is autogenic training – a self-regulation method that allows an individual to achieve a state of deep relaxation and stress reduction through a series of exercises. Traditional approaches to autogenic training require continuous monitoring and supervision. Given that the technique of autogenic training can be performed at home, the need for applications that can organize and monitor the technique and the individual's condition is becoming increasingly relevant. The use of artificial intelligence for the development and optimization of autogenic training opens up new possibilities for creating personalized, adaptive, and highly effective correction programs for psychophysical states. The ability to analyze large volumes of real-time health data allows for the training programs to be adapted to the needs of a specific individual, monitor progress, and adjust techniques to achieve optimal results. This approach not only improves

the effectiveness of autogenic training but also makes it more accessible and convenient for use in the daily lives of high-risk professionals.

Main part. This article aims to explore the potential application of artificial intelligence in the development of autogenic training programs for the correction of the psychophysical state in high-risk professionals.

The aim of the article is to assess the feasibility of implementing AI tools in the development of autogenic training programs aimed at correcting the psychophysical state of professionals at high risk of disorders leading to functional impairments. We will examine the causes of stress, define the sequence and methods of autogenic training, identify the opportunities and challenges of integrating artificial intelligence into self-regulation processes, and discuss the potential advantages and disadvantages of such innovative approaches for preventing functional disorders among high-risk professional groups.

Results and Discussion. The question of utilizing artificial intelligence in the development of autogenic training for the correction of the psychophysiological state in high-risk professionals to prevent functional disorders remains underexplored in the scientific literature. Therefore, this research largely relies on expert literature that examines the use of applications and artificial intelligence in mental health correction. Despite this, the study is based on a series of theoretical works dedicated to autogenic training.

Research by Akhtar and Aydin (2019) highlights the importance of psychophysiological well-being in high-risk professional groups such as doctors, emergency responders, and social workers, emphasizing the urgency of developing effective correction methods. Traditional approaches to autogenic training, as demonstrated in studies by Ernst and Kanji (2000), Seo and Kim (2019), and Kircher et al. (2002), prove their effectiveness in reducing stress and anxiety. The issues of professional burnout and psychophysiological disorders, which are common among high-risk professionals, are discussed in studies by Khammissa et al. (2022), Kumar et al. (2022), and Makara-Studzińska et al. (2022).

Given the minimal amount of research directly focused on the use of artificial intelligence in the development of autogenic training for the target audience, the search for new approaches and solutions remains relevant. There is a lack of systematized material on this topic, which stimulates further research and the use of various scientific methods to analyze, group, and systematize information that could be presented in a more structured form in light of this topic.

Manifestations of Psychophysical Disorders in High-Risk Professions. In the demanding and often hazardous realms of high-risk professions, the incidence of psychophysical disorders is notably elevated. These professions are characterized by significant stress, high demands, and potentially perilous conditions that contribute to both acute and chronic psychophysiological disorders. Understanding the nuances of these manifestations requires an appreciation of the multifaceted nature of these jobs and the diverse impacts they have on individuals' health and well-being.

Professionals in these sectors are often subjected to a high level of stress, working in environments where the stakes are considerable, the margin for error is minimal, and the repercussions of mistakes can be dire. This elevated stress level is a fundamental trigger for various psychophysical disorders.

Another critical aspect is emotional labor, particularly relevant in jobs demanding constant interaction with others, often under conflict, distress, or suffering. Such emotional expenditure can lead to emotional exhaustion and depersonalization, both of which are hallmarks of burnout syndrome.

Irregular working hours also play a significant role, with many high-risk jobs involving long shifts, night duties, and on-call obligations that disrupt natural circadian rhythms, leading to both physical and mental fatigue.

In addition to these factors, certain professions, especially those in law enforcement and the military, entail direct physical risks, including exposure to hazardous conditions and life-threatening situations. These physical risks, coupled with high cognitive demands for quick decision-making

and problem-solving under pressure, contribute significantly to cognitive overload and subsequent psychophysical strain.

Compassion fatigue is another significant issue, especially for professionals in healthcare and social services who support individuals experiencing trauma or distress, which can profoundly affect their well-being and efficacy (Makara-StudziÑska et al., 2022).

It's crucial to acknowledge that these professionals, like the general population, are also influenced by socio-economic factors. Primary among these are chronic fatigue and overwork resulting from intense workloads, and adverse psycho-emotional states related to insufficient mobilization or residual excitement (tension). Depending on their severity and nature, these disorders can affect the body's compensatory mechanisms to varying degrees, ultimately reducing the human organism's reserve capacities and leading to illnesses.

The changes in the body's functional systems, their severity, the speed of their onset, and their temporal characteristics depend not only on the influence of external factors (their intensity and qualitative characteristics) but also on individual psychological factors (genotypic and phenotypic) that determine the functioning of the body's main systems, perception of events, experience of overcoming challenges, etc. When there's a mismatch between internal and external factors, tension (overstrain, breakdown) in regulatory functions occurs, leading to disturbances in homeostasis, the body's adaptive capabilities, and the emergence of functional disorders, psycho-vegetative manifestations, and psychosomatic diseases.

Currently, the impact of adverse professional factors on the health potential of firefighters and rescuers is assessed by indicators of professional morbidity. Studies show that 20–25% of individuals in "high-risk professions" are clinically diagnosed with diseases of various organs and systems. In 75–80% of cases, clinical manifestations of diseases in this category are absent, but this does not mean that there are no functional disorders or disorders leading to the onset of diseases. It's noted that the proportion of "healthy" individuals decreases more than 10–15 times after ten years of work, and by the end of their professional activity, no more than 5% of individuals can be considered "practically healthy."

These findings underscore the need for more effective preventive measures to maintain the professional health of individuals in high-risk professions. While modern healthcare predominantly focuses on identifying, treating, and preventing recurrent diseases, it is not sufficiently effective in detecting and treating individuals with only disease manifestations among this professional group. Preventing potential functional impairments and diseases is crucial for preserving the professional longevity and health of firefighters and rescuers.

Psychophysical Disorders in High-Risk Professional Groups often encompass a broad spectrum of symptoms and manifestations ranging from mild to severe. These can include emotional burnout, anxiety, depression, chronic stress, decreased productivity, physical fatigue, and somatic disorders. High levels of stress and anxiety can lead to a deterioration in quality of life, sleep disturbances, reduced concentration and work efficiency, and an increased risk of developing dependencies on alcohol or drugs as a mechanism for coping with stress.

Functional impairments in specialists of high-risk professions may include various physiological and psychological symptoms that negatively impact their ability to perform professional duties. Physiological manifestations of these disorders can include tremors, which are uncontrollable shaking of the hands or other body parts, making it difficult to perform precise and demanding tasks. Vomiting and nausea, often caused by extreme stress or strain, can significantly reduce physical condition and overall well-being, limiting the ability to concentrate and endure over extended periods.

Psychological aspects of functional impairments cover feelings of fear and anxiety, which can be particularly intense in high-risk and unpredictable conditions characteristic of some professions. These emotional states can lead to a reduction in decision-making ability, sleep disturbances, and

overall mental health. Impaired coordination of movements, another symptom, can complicate the execution of tasks requiring precision and interaction, which is especially critical in conditions where high accuracy and quick response are key to safety and efficiency (Khammissa et al., 2022).

The most serious and extreme manifestation of psychophysical disorders is suicide, which, unfortunately, occurs much more frequently among high-risk professionals. High levels of emotional and physical strain, access to means of suicide, stigmatization of mental disorders, and insufficient support can contribute to choosing such a tragic way of solving problems (Molton & Raichle, 2009). The statistics on psychophysical illnesses among high-risk professions are staggering. For instance, according to American statistics, the likelihood of suicide among male doctors is 40% higher than among their peers not in the medical profession. This stark contrast underscores the intense pressure and challenges faced by those working in the medical field. Similarly, among veterinarians – a group often overlooked in discussions about high-risk professions – the suicide rate is 3.5 times higher among women and 2.1 times higher among men compared to the general U.S. population, with a significant portion of these tragedies occurring among those working with small animals (Akhtar & Aydin, 2019).

Treatment Methods for Psychophysical Disorders in High-Risk Professionals. Treating psychophysical disorders among high-risk professions, such as medical workers, emergency responders, military personnel, and others who regularly face extreme stress situations, requires an integrated approach. This approach should include self-help strategies that promote self-awareness and self-assessment, as well as professional interventions. It is crucial for professionals to acknowledge their emotional discomfort and not hesitate to seek help, practicing self-care, which is a key element in training potential therapists.

Engagement in mindfulness practices, such as meditation and mindfulness, can support self-care and overall well-being. Measures aimed at reducing workload, improving management and administrative skills, and better emotion management can be beneficial in preventing psychophysical disorders. Clinical supervision and mentorship from more experienced colleagues can effectively reduce burnout and distress levels. Organizations should provide adequate support both online and offline, and young professionals should utilize all opportunities to enhance their qualifications, allowing them to manage their clients' mental health more confidently, thereby reducing their own levels of distress (Kumar et al., 2022).

Autogenic training is an important part of a comprehensive strategy for treating psychophysical disorders, especially among professions at high risk of stress. This self-help method is based on self-regulation and self-relaxation, where an individual learns to reduce physical and mental stress through a series of systematic exercises that promote deep relaxation and mental calmness (Seo & Kim, 2019).

The main objectives of autogenic training include teaching the individual to control their physiological and psychological responses to stress, improving concentration, and increasing self-awareness levels. Through regular practice, individuals learn to induce a state of deep relaxation, which helps reduce tension, anxiety, and fatigue, and enhances overall well-being.

The significance of autogenic training in treating psychophysical disorders lies in its ability to support mental health and promote recovery. This method is particularly useful for high-risk professions as it provides tools for independent stress management in high-pressure conditions. Autogenic training can serve as a preventive measure against burnout and emotional exhaustion, helping individuals maintain a balance between work and personal life, thereby ensuring long-term mental and physical health (Kircher et al., 2002).

Digital Technologies in Autogenic Training. The use of digital technologies significantly expands the possibilities of autogenic training, offering innovative solutions for psychophysical correction.

Artificial Intelligence (AI), in particular, makes a substantial contribution to this field, providing personalized approaches and adapted techniques that contribute to mental health improvement.

One of the key technologies in this context is Natural Language Processing (NLP), which allows for the development of applications with virtual assistants and AI-driven chatbots. Such tools can become indispensable assistants in the process of autogenic training, as they provide feedback, recommendations, and real-time support. Applications like "Woebot" and "Replika" enable users to engage in dialogue on any topic with the bot, receiving responses and advice that facilitate positive changes in thinking and behavior.
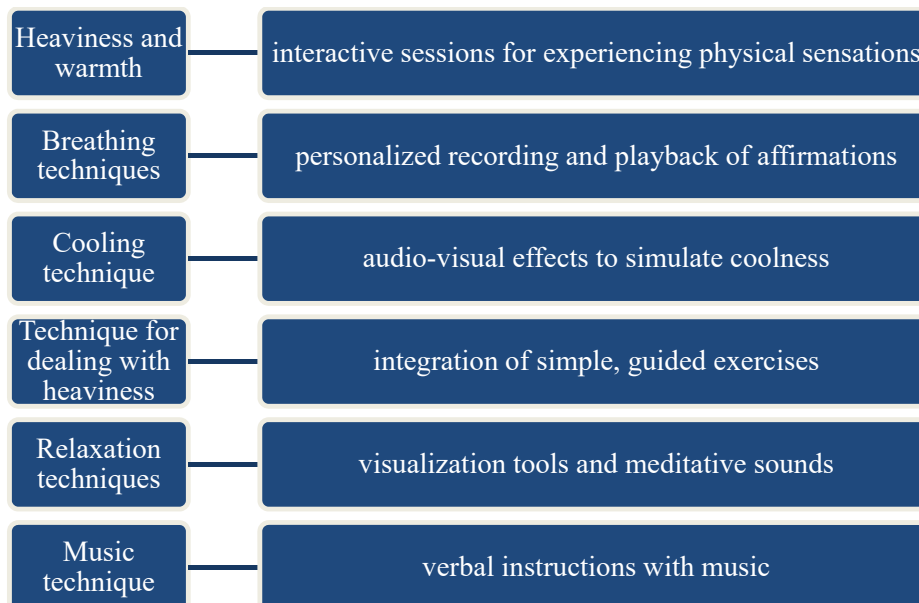
Applications such as "Headspace", "Moodkit", and "Clarity" utilize AI to track the user's mood, analyze behavioral patterns, and provide specific steps for improving the psychophysical state. They offer self-monitoring and self-correction tools, which are central to autogenic training.

Furthermore, some apps employ gamification and motivational techniques to engage users and sustain their involvement in the autogenic training process. For instance, "Happify" offers game-based and educational activities aimed at improving mental well-being (Care, 2023).

AI Opportunities in Autogenic Training Development. While many modern AI applications are largely focused on mental health improvement, finding a perfect solution that fully meets the needs of autogenic training remains challenging. Autogenic training is a comprehensive practice that requires a deep understanding of human physiology and psychology, as well as specific relaxation techniques described by the developers of the training (Ernst & Kanji, 2000).

Heaviness and Warmth. In developing an app for autogenic training, the main focus should be on creating an interactive environment that helps users feel heaviness and warmth in various body parts as envisioned by the standard Schultz and Luthe technique. The use of voice commands and sound effects can significantly enhance this process, providing users with the opportunity to immerse deeply in relaxation and self-regulation.

Breathing Technique. For the modified Schultz technique, which includes breathing and the use of personal formulas, the app could provide a feature for recording and playing back personalized affirmations. This would allow users to create their own positive narratives, which can be integrated into the training process, promoting psychological well-being.

Heaviness and warmth	interactive sessions for experiencing physical sensations
Breathing techniques	personalized recording and playback of affirmations
Cooling technique	audio-visual effects to simulate coolness
Technique for dealing with heaviness	integration of simple, guided exercises
Relaxation techniques	visualization tools and meditative sounds
Music technique	verbal instructions with music

Fig. 1. Artificial intelligence in correctional programs: Key points

Cooling Technique. The Luthe technique, which involves a sensation of coolness along with traditional elements of autogenic training, requires the app to provide a deeper level of immersion. Using audio-visual elements that mimic coolness or the sensation of a breeze can enhance the effectiveness of the training, providing a more comprehensive approach to relaxation.

Heaviness Technique. A simplified version of the Budzynski technique, focused solely on the sensation of heaviness, is ideally suited for integration with recorded instructions. The app could contain a library of ready-made audio guides that users can use for self-training, simplifying the learning and practice process.
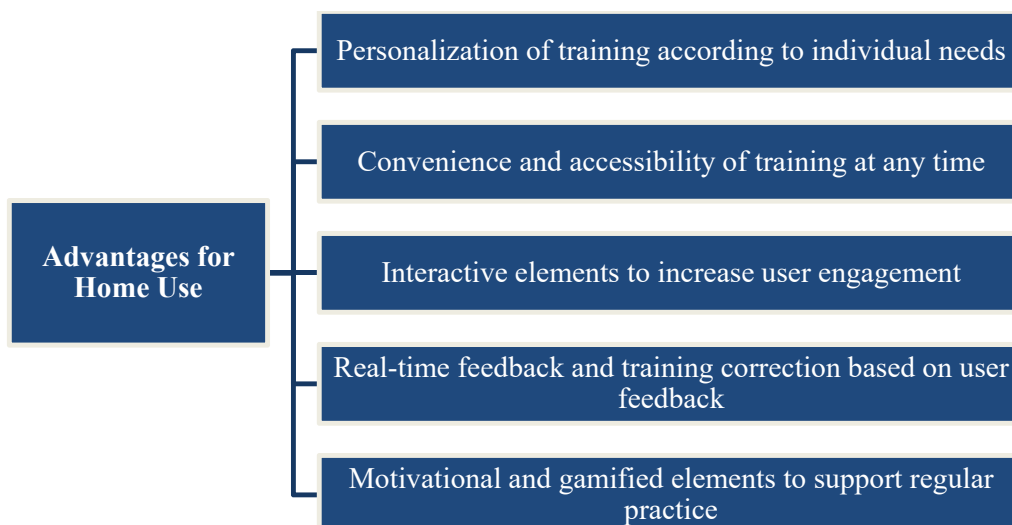
Relaxation Technique. The extended Schultz technique, which includes attention to breathing patterns, neck and shoulder relaxation, and the use of mental imagery to enhance relaxation efficiency, requires the app to provide a wide range of tools. From visualizations and meditative sounds to interactive instructions, each element should be carefully thought out to ensure a deep level of relaxation.

Music Technique. Finally, the Luthe technique with music, which combines verbal instructions with musical accompaniment, requires the app to integrate with high-quality audio files. Music should be carefully selected to match and enhance the effect of verbal instructions, creating synergy that promotes deep relaxation (Ernst & Kanji, 2000).

Application developers always strive to automate all processes, but the question of whether autogenic training can be fully replaced by artificial intelligence (AI)-based applications remains dubious. Undoubtedly, AI can play a significant role in organizing autogenic trainings, providing personalized guides to help users track their emotional state and progress in well-being. It can also offer access to a virtual interlocutor at any time, helping users express their thoughts and emotions, maintain a diary of daily impressions, and encourage activities that improve mental health.

However, despite these capabilities, AI cannot fully replace a human specialist, as it is incapable of conducting in-depth psychoanalysis, diagnosing, or prescribing treatment. Psychotherapists and psychiatrists use complex therapeutic approaches such as cognitive-behavioral therapy and can prescribe medication when necessary (Stern et al., 2012).

The integration of Artificial Intelligence (AI) in the development of autogenic training applications opens new possibilities for supporting psychophysiological health. These applications can be tailored for home use. Understanding these advantages is crucial for the effective implementation and utilization of AI in corrective programs (Fig. 2).

Advantages for Home Use
- Personalization of training according to individual needs
- Convenience and accessibility of training at any time
- Interactive elements to increase user engagement
- Real-time feedback and training correction based on user feedback
- Motivational and gamified elements to support regular practice

Fig. 2. Advantages of AI in Autogenic Training home use Applications

The advantages of artificial intelligence in autogenic training applications significantly expand the possibilities for correcting psychophysiological states, both at home and in a professional medical environment. Using AI in autogenic training can be beneficial as an auxiliary tool that helps users become more aware of their mental health and promotes self-development. However, to achieve deeper positive changes in mental health and address serious psychological issues, it is important to consult qualified professionals. AI can complement traditional therapy but not replace it.

AI-based programs can also be successfully used for professional purposes. They can become a part of correctional programs used in psychocorrection centers. Let's consider the advantages of using artificial intelligence for professional psychophysical correction programs.

AI-based applications for mental health support have several limitations that can restrict their effectiveness and acceptance among users.

– Technical Failures. A key issue is the reliability of the technology. Technical failures, software bugs, or hardware problems can lead to malfunctioning applications, which is unacceptable for technologies used for medical or psycho-correctional purposes. Such issues can harm by providing incorrect instructions that could exacerbate the psychophysical state.
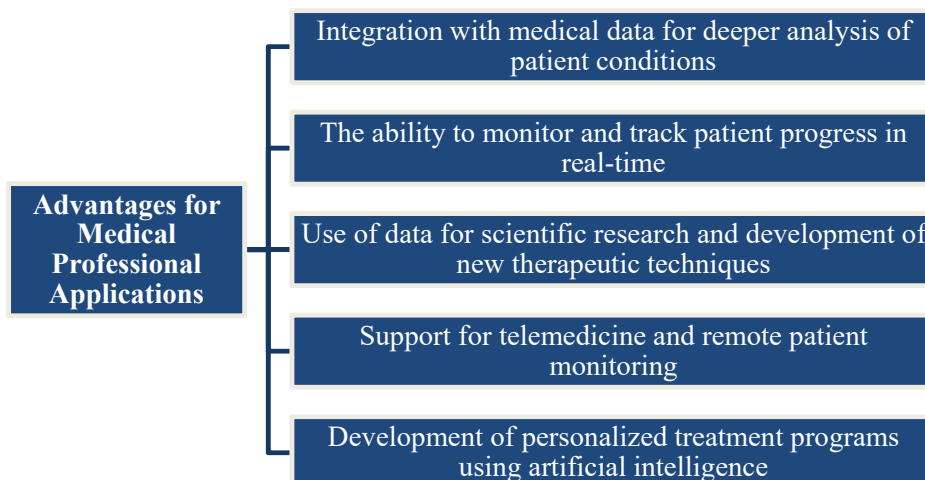
– Engagement. Not all users are interested in using technology to improve their mental health. Ironically, technology can distract people from health-promoting activities, such as walking outdoors or interacting with real people.

– Ethics. The use of AI raises ethical questions related to user privacy and data security, responsibility and transparency of algorithms, consent and user autonomy, as well as potential harm or misuse of technology. Legal frameworks to regulate these aspects are not yet perfected, creating risks for both users' rights and manufacturers.

These drawbacks require careful consideration in the development and implementation of AI applications for mental health support to ensure their safety, effectiveness, and ethical use.

Conclusions. High-risk professions are associated with stress, high demands, and hazards that contribute to psychophysical disorders such as burnout and emotional exhaustion. Symptoms of psychophysical disorders include anxiety, depression, physical disorders, and decreased productivity.

The treatment of psychophysical disorders in high-risk professional groups requires a comprehensive approach that includes self-help, meditation, mindfulness, workload reduction, and autogenic training. Autogenic training, as a method of self-regulation, stands out for its effectiveness in reducing stress and enhancing overall well-being, becoming a key element in the prevention of burnout and emotional exhaustion. Today, many AI-based applications are being developed to improve mental

Integration with medical data for deeper analysis of patient conditions

The ability to monitor and track patient progress in real-time

Advantages for Medical Professional Applications

Use of data for scientific research and development of new therapeutic techniques

Support for telemedicine and remote patient monitoring

Development of personalized treatment programs using artificial intelligence

Fig. 3. Advantages of AI in Autogenic Training Professional Applications

health. However, there is a lack of applications specifically for autogenic training; their functionality should include various approaches to training, such as interactive effects used to simulate warmth and heaviness, recording and playback of personal affirmations important for breathing exercises, audio-visual effects useful for simulating coolness, deep relaxation tools applied to support relaxation, and musical accompaniments used for music therapy.

References:
1. Akhtar, A., & Aydin, R. (2019). Some of the jobs most at risk for suicide and depression are the most important to society. Here's a rundown of mental-health risks for doctors, childcare workers, first responders, and more. Business Insider. URL: https://www.businessinsider.com/jobs-with-mental-health-risks-like-suicide-depression-2019-10
2. Care, M. (2023). Mental health apps and the role of AI in emotional well-being. MyaCare. URL: https://myacare.com/blog/mental-health-apps-and-the-role-of-ai-in-emotional-wellbeing
3. Ernst, E., & Kanji, N. (2000). Autogenic training for stress and anxiety: A systematic review. Complementary Therapies in Medicine, 8, 106–110. URL: https://pubmed.ncbi.nlm.nih.gov/10859603/
4. Khammissa, R., Nemutandani, S., Feller, G., Lemmer, J., Feller, L. (2022). Burnout phenomenon: neurophysiological factors, clinical features, and aspects of management. J Int Med Res. 2022 Sep; 50(9):3000605221106428. doi: https://doi.org/10.1177/03000605221106428
5. Kircher, T.; Teutsch, E.; Wormstall, H.; Buchkremer, G.; Thimm, E. (2002). Effects of autogenic training in elderly patients. Z. Gerontol. Geriatr. 35, 157–165. URL: https://link.springer.com/article/10.1007/s003910200020
6. Kumar, K., Shankar, A., & Singh, A. (2022). Mental health problems among mental health professionals: A neglected issue. International Journal of Advanced Medical and Health Research, 9(1), 13–17. DOI: https://doi.org/10.4103/ijamr.ijamr_67_22
7. Makara-Studzińska, M., Kruczek, A., Borzyszkowska, A., Załuski, M., Adamczyk, K., Basińska, M.A. (2022) Profiles of Occupational Burnout in the Group of Representatives of High-Risk Professions in Poland. International Journal of Environmental Research and Public Health, 19(10):6297. DOI: https://doi.org/10.3390/ijerph19106297
8. Molton, I. & Raichle, K.. (2009). Psychophysiological Disorders. Diagnostic Interviewing (pp. 343–369). DOI: https://doi.org/10.1007/978-1-4419-1320-3_15
9. Seo, E.; Kim, S. (2019). Effect of Autogenic Training for Stress Response: A Systematic Review and Meta-Analysis. J. Korean Acad. Nurs. 49, 361–374. URL: https://jkan.or.kr/DOIx.php?id=10.4040/jkan.2019.49.4.361
10. Stern, R.M., William, J., & Karen S. Q. (2012). Applications of Psychophysiological Recording. Psychophysiological Recording, 2nd edn. DOI: https://doi.org/10.1093/acprof:oso/9780195113594.003.0015