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Psychological Assistance and Self-Help for Individuals in War-Related Psychotraumatic Situations: A Digital Tool for Neurorehabilitation

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Abstract: *This narrative review presents a comprehensive theoretical and methodological analysis of the neurophysiological mechanisms underlying the formation of stress and depressive states under conditions of military conflict. It aims to conceptualise a multimodal model of neurorehabilitation and to substantiate neurorehabilitation as a systemic approach to psychological support and self-help. The proposed framework integrates biochemical and structural approaches to optimising brain function with artificial intelligence (AI) technologies and emerging (currently experimental) tools from digital psychiatry and AI-assisted mental healthcare. The review is based on a synthesis of contemporary evidence from neurobiology, cognitive behavioural therapy, neuroplasticity research, and machine learning. It clearly distinguishes between clinically validated interventions (e.g., cognitive behavioural therapy and aerobic exercise) and emerging or hypothetical approaches, such as AI-assisted detection of putative neurobiological imbalances and automated prediction of depression risk. A systems approach was applied to analyse the interaction of neurotransmitter systems (GABA, glutamate, serotonin, dopamine) and structural components of the brain (amygdala, hippocampus, prefrontal cortex) under conditions of extreme wartime stress, and to identify the role of AI in the personalisation of neurorehabilitation protocols, monitoring emotional states through natural language analysis, and creating adaptive environments for cognitive correction. The article systematises neurorehabilitation methods distributed according to levels of influence: physiological (breathing practices, nutritional support), cognitive (narrative therapy, modification of mental attitudes), and behavioural (activation of the left hemisphere through motor activity). It is demonstrated that the integration of these methods makes it possible to use neuroplasticity for the "dismantling" of traumatic neural circuits through digital AI tools, the authors argue that successful rehabilitation in wartime situations is possible only with a transition from passive experiencing/living through trauma to active "reprogramming" of the brain. The material proposes a holistic conceptual model of self-help in which a person acts as an active subject of neurobiological change, the conclusions of the article have practical significance for psychotherapists, volunteers, and individuals experiencing chronic stress, providing them with scientifically grounded tools for maintaining mental health.*

Keywords: *neurophysiology of trauma; neuroplasticity; wartime stress; neurorehabilitation; artificial intelligence in psychology; digital neurorehabilitation; psychological support chatbots; narrative review; levels of evidence.*

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1. Introduction

Modern military conflicts are accompanied by extreme psychological pressure on both civilians and military personnel, which leads to the emergence of complex forms of adjustment disorders. Exposure to a psychotraumatic situation may lead to the decompensation of mental functions, which manifests as a complex destructive syndrome. When the intensity of wartime stressors – from a direct threat to life to prolonged sensory deprivation in shelters – exceeds an individual's physiological resources, there is a need to move from supportive therapy to systemic neurorehabilitation.

Traditional linguodidactic and psychological approaches often focus on the external manifestations of PTSD, leaving aside the internal "architecture" of stress resistance. ICT use has been found to be associated with neuroplasticity in adults. However, the direction of this relationship and its specific causal mechanisms remain poorly understood.

Contemporary neuroimaging studies suggest that chronic exposure to war-related stress may be associated with structural and functional brain alterations. These include changes in amygdala reactivity and altered functional connectivity involving the prefrontal cortex and hippocampus. However, the directionality of these associations and the underlying causal mechanisms remain incompletely understood.

In this context, the digital transformation of psychological assistance is particularly important. The integration of artificial intelligence (AI) technologies represents a promising direction that may facilitate the transition from general recommendations to precision neurorehabilitation. Machine learning algorithms may be capable of analysing biometric data and linguistic markers to support real-time monitoring of neurophysiological states, potentially creating new opportunities for personalised self-help. However, the clinical effectiveness of these approaches remains under active investigation and requires rigorous empirical validation.

2. Conceptual Aim of the Article

This work proposes a reconsideration of the role of the individual in the process of overcoming trauma from the perspective of neurobiological self-management. Neurorehabilitation in the context of war trauma is considered here as a purposeful process of forming new neural connections that allow a person to move beyond the destructive state of "survival". This article proceeds from the assumption that not only external actions but also cognitive processes—observation, analysis, and reflection—act as physical factors in the structural reorganisation of the brain, an additional aim is to substantiate the role of AI assistants as intellectual mediators in the process of neurobiological coaching and emotional stabilisation.

3. Materials and Methods

3.1. Review Design

This study was conducted as an interdisciplinary narrative review incorporating theoretical analysis and conceptual modelling. The review was carried out between September 2024 and December 2025. It did not involve original data collection or clinical research involving human participants. Instead, it was based on the systematic identification, critical appraisal, and narrative synthesis of peer-reviewed literature, empirical neuroimaging evidence (e.g., fMRI and EEG studies), clinical guidelines, and conceptual developments in the fields of trauma neurobiology, cognitive behavioural therapy (CBT), digital psychiatry, and artificial intelligence (AI).

3.2. Methodological Foundations

To ensure transparency and objectivity in the coverage of the topic, a targeted search of the scientific literature was conducted in the electronic databases Scopus, Web of Science, PubMed, and Google Scholar for the period 2015–2026. The search strategy involved combinations of keywords and Boolean operators: ["speech therapy technologies" OR "logopedics" AND “neuroplasticity” OR “ICT” OR “hybrid methods”]. The inclusion criteria were relevance to the review topic, the presence of peer review, and whether the study was original or a review. Sources without full access to the text, conference materials, and publications with insufficiently substantiated methodology were excluded from the review. Preliminary critical selection was carried out based on titles and abstracts. This step was followed by a qualitative content analysis of full-text publications.

The article applies an integrative approach that combines data from neurophysiology (the study of neurotransmitter balance) and methods of cognitive-behavioural correction, this approach makes it possible to substantiate a self-help model in which a change in the way of thinking acts as a tool of biological stabilisation. The methodology also includes an analysis of the effectiveness of using neurotechnologies and AI algorithms for pattern analysis of cognitive traps, which makes it possible to automate the process of trigger detection and propose adaptive cognitive exercises. The relevance of the study is determined by the need to develop effective, scientifically grounded protocols of neuropsychological support that can be implemented both in professional therapy and in practices of individual self-help under the conditions of a prolonged military conflict. The combination of traditional methods of psychotherapy with the capabilities of modern artificial intelligence creates a hybrid rehabilitation model capable of providing continuous and personalised support for individuals in psychotraumatic situations.

4. Theoretical Analysis of the Study

4.1. Neurotransmitter Balance as the Basis of Emotional Stability

The human brain is one of the most complex organs, despite the fact that its weight does not exceed 3% of the total body mass (Harris et al., 2012). It contains approximately 86 billion nerve cells (neurons) that ensure the functioning of the nervous system (Azevedo et al., 2009), as well as numerous auxiliary cells; a key aspect of neural functioning is the balance between the excitatory neurotransmitter glutamate and the inhibitory neurotransmitter gamma-aminobutyric acid (GABA).

The monoamine hypothesis has long been a dominant framework in psychopharmacology, explaining depressive and anxiety disorders primarily in terms of neurotransmitter imbalance. However, contemporary psychiatry and neuroscience recognise that this model is an oversimplification. Depression and post-traumatic stress disorder (PTSD) are heterogeneous conditions with multifactorial aetiologies involving genetic and neurobiological factors, including alterations in brain structure, function, and neural circuitry (Ploski & Vaidya, 2021).

Nevertheless, the study of individual neurotransmitter systems, including γ-aminobutyric acid (GABA), glutamate, serotonin, and dopamine, remains valuable for understanding specific mechanisms of the stress response. It may also help identify potential therapeutic targets (Martsenkovskyi & Martsenkovskyi, 2021; Pinchuk et al., 2025).

Neurons produce neurotransmitters—biologically active chemical substances that help transmit electrical impulses to other neurons through a special gap called a synapse, each neuron can form connections with numerous other neurons, and these interconnections change as a person acquires new knowledge. Electrochemical impulses regulate the functioning of the entire organism (Pinchuk et al., 2025).

A key factor in emotional resilience in wartime conditions is maintaining a dynamic balance between the excitatory and inhibitory systems of the brain. For a conceptual understanding of the impact of wartime stressors on brain biochemistry, it is advisable to systematise the functions of the main neurotransmitters (see Table 1).

Table 1. Functional Role of Key Neurotransmitters in the Formation and Overcoming of Wartime Stress (Chaban & Khaustova, 2022)

Neurotransmitter	Probable changes during acute and chronic stress	Associated psychophysiological manifestations	Recovery resource / intervention
GABA	Decreased activity	Persistent tension, anxiety, insomnia	Vitamin B6, relaxation techniques
Serotonin	Deficiency under chronic stress	Persistent tension, anxiety, insomnia	Light therapy, tryptophan, sunlight
Dopamine	Suppression under high cortisol levels	Loss of motivation, anhedonia	Achievement of micro-goals, physical activity
Glutamate	Pathological excess	Amygdala hyperactivity, “flashbacks”	Cognitive correction, meditation

Source: The authors’ own conception

Legend to Table 1

GABA – gamma-aminobutyric acid, the principal inhibitory neurotransmitter in the central nervous system (CNS).

Glutamate – the principal excitatory neurotransmitter in the CNS. Excessive glutamate activity is associated with excitotoxicity and hyperactivation of stress-related neural circuits (Wan et al., 2025).

Pathogenesis of trauma – neurobiological changes, including alterations in neurotransmitter systems, associated with prolonged exposure to war-related stress.

Recovery resource – non-invasive endogenous and exogenous factors, such as nutritional interventions, physical activity, and cognitive or behavioural practices, that may support the restoration of neurobiological homeostasis without pharmacological treatment.

The data presented in the table suggest that war-related psychological trauma has a clear biochemical substrate.

Therefore, neurorehabilitation may include methods that influence specific neurotransmitter pathways.

At present, more than 50 types of neurotransmitters have been identified, some of which have excitatory effects, while others have inhibitory effects (Moini et al., 2024). Most neural impulses are transmitted with the help of two neurotransmitters: glutamate and gamma-aminobutyric acid. The former is an excitatory neurotransmitter and promotes the formation of new neural connections. Its level is regulated by gamma-aminobutyric acid (GABA), which reduces neuronal activity, improves the dynamics of nervous processes, and has a positive effect on anxiety and related disorders. When GABA levels decrease, the brain may remain in a state of increased excitability.

As a result, a person may experience unfounded feelings of fear and anxiety, distraction, and an inability to concentrate or relax. Sleep disturbances may occur due to an excessive flow of thoughts, and there may be an increased craving for high-carbohydrate foods, alcohol, or drugs. As a result, emotional health requires a balance between glutamate and gamma-aminobutyric acid. For the synthesis of GABA, which occurs in brain cells from glutamate, vitamin B6 is necessary. A deficiency of this vitamin may lead to a decrease in GABA production, an accumulation of glutamate, and, consequently, nervous overstrain (Buenrostro-Jáuregui et al., 2025).

A promising, although currently theoretical, approach is the potential use of AI assistants to support monitoring of one’s cognitive state. Such systems can analyse linguistic patterns in a person’s speech or writing. Reduced lexical diversity and negative emotional valence of textual utterances serve as digital linguistic markers of maladaptive psychological states. Although these features may be associated with general psychophysiological stress responses, they should not be interpreted as direct indicators of a specific neurochemical imbalance in the absence of direct empirical evidence.

The use of thought stimulation engineering and reflective interaction with AI may reduce cognitive load and streamlining mental representations. This may create the prerequisites for psycho-emotional stabilisation and reduce the subjective perception of stress.

A healthy lifestyle also has a positive effect on maintaining an optimal balance of these neurotransmitters. Other major neurotransmitters include serotonin, noradrenaline, and dopamine. Serotonin (5-hydroxytryptamine, 5-HT) plays a key role in modulating affective states, regulating emotional homeostasis, and reducing anxiety levels. A deficiency of serotonin may be associated with depression, increased anxiety, and obsessive disorders. The synthesis of serotonin requires sunlight (which explains why people often feel more depressed in late autumn and winter, when daylight hours decrease), tryptophan (the amino acid from which serotonin is produced), and glucose. Therefore, to increase serotonin levels and improve mood, it is necessary to consume foods rich in tryptophan (such as dairy products, tomatoes, dates, and dark chocolate) and spend more time in natural light.

Noradrenaline and dopamine also regulate emotional states, enhance concentration, and influence motivation. Dopamine reduces anxiety and is one of the main neurotransmitters responsible for the feeling of pleasure. There are medications that imitate or block the functioning of certain neurotransmitters.

However, the integration of AI into biological feedback systems (biofeedback) may open new possibilities for the non-pharmacological regulation of dopamine through gamified neurorehabilitation practices. These practices may stimulate the release of pleasure-related neurotransmitters by encouraging the achievement of micro-goals in a virtual environment.

4.2. Neuroanatomy of Stress: Interaction Between the Amygdala and Cortex

All emotions are formed in the amygdala, which must harmoniously interact with the orbitofrontal cortex, responsible for decision-making. Early positive interpersonal experiences may facilitate the maturation and modulation of functional connectivity between the amygdala and the orbitofrontal cortex. Disruption of connections between the orbitofrontal cortex and the amygdala or hippocampus can lead to emotional disorders, resulting in states of depression and anxiety.

Early neuropsychological theories often explained depressive states in terms of an imbalance in interhemispheric activation or right-hemisphere dominance. However, contemporary neuroscience recognises that this view is overly simplistic. Interhemispheric asymmetry is considered only one of several electrophysiological correlates of depression. Emotion processing is mediated by complex, distributed brain networks, including the default mode network (DMN), the salience network (SN), and other large-scale functional networks.

In the context of modern neurorehabilitation, artificial intelligence (AI) technologies play a critical role in visualising and predicting these neuroanatomical shifts. AI algorithms analyse functional MRI data, potentially allowing hyperactivity of the amygdala to be detected with high precision even at preclinical stages. Moreover, AI-based predictive modelling helps develop personalised cognitive load scenarios that "train" the prefrontal cortex to more effectively suppress irrational fear impulses, restoring lost executive control over emotions (Wan et al., 2025).

Typically, a person has time to think before feeling fear, which is beneficial because they can calm themselves. However, this process can sometimes lead to the emergence of irrational fears. Additionally, the amygdala can trigger panic before the cortex has analysed the situation. It sends electrical impulses throughout the autonomic nervous system, causing the adrenal glands to release adrenaline into the bloodstream, followed by the stress hormone cortisol (Chaban & Khaustova, 2022).

As a result, a person's heart rate increases, blood pressure rises, and muscles receive a higher supply of oxygen. Cortisol can sustain stress coping for a longer period than adrenaline and temporarily stimulates dopamine production, providing the body with energy. However, prolonged elevated cortisol levels negatively affect the brain and body. Dopamine levels decrease, the amygdala becomes hypersensitive, leading to mood swings, depression, and chronic stress.

Individuals may become anxious and distressed. Furthermore, cortisol enhances synaptic transmission of glutamate, an excitatory neurotransmitter, in the hippocampus, resulting in persistent behavioural patterns and difficulty forgetting stressful triggers (Rektor et al., 2023).

The current literature increasingly explores the potential of machine learning algorithms for analysing fMRI and EEG data (Wan et al., 2025). These approaches have shown promise for identifying patterns associated with neuropsychiatric disorders. However, claims that AI can predict depression before the onset of symptoms or accurately model neuroanatomical changes remain largely hypothetical. Machine learning is effective at identifying statistical patterns in large datasets, but its clinical predictive performance at the individual patient level has not yet been established. Further standardisation, external validation, and prospective clinical studies are required before these approaches can be implemented in routine clinical practice.

In modern neuroscience, artificial intelligence (AI) technologies are increasingly applied to analyse these complex processes. The use of these markers represents a promising direction for theoretical modelling. In the future, they may expand the potential for presymptomatic prediction. However, their clinical effectiveness at the individual level remains to be empirically validated. Using AI to analyse large datasets (Big Data) in neuropsychology helps personalise self-help strategies, selecting specific exercises to strengthen connections between the cortex and amygdala according to an individual's neuroprofile (Wan et al., 2025).

For a systematic understanding of brain transformation under trauma and during recovery, a comparative characterisation of key neuroanatomical nodes is presented below (see Table 2).

Table 2. Comparative Characteristics of Neuroanatomical States: "Survival" vs. "Neurorehabilitation"

Brain structure	State under chronic war stress	State after neurorehabilitation
Amygdala	Hyperactivity, constant panic state	Reduced reactivity, emotional control
Hippocampus	Impaired neurogenesis, trauma fixation	Volume restoration, consolidation of positive experiences
Prefrontal Cortex	Loss of executive control over emotions	Strengthened rational analysis and volitional regulation
Interhemispheric interaction and network integration	Right hemisphere dominant (passive)	Left hemisphere activated (action, language, optimism)

Source: The authors' own conception

Legend to Table 2

Survival state – a neurobiological state associated with prolonged exposure to stress hormones (e.g., cortisol and adrenaline) and sustained activation of the sympathetic nervous system.

Post-neurorehabilitation state – a conceptual representation of structural and functional changes in neural networks associated with adaptive neuroplasticity following neurorehabilitation.

Amygdala – a brain structure involved in threat detection, emotional processing, and affective responses.

Prefrontal cortex – a brain region involved in executive functions, cognitive control, decision-making, and the regulation of emotional responses.

The conceptual framework summarised in Table 2 suggests that neurorehabilitation aims to counteract the adverse neurobiological changes associated with prolonged war-related stress by promoting adaptive neuroplasticity. However, this conceptual framework should not be interpreted as evidence of a direct causal effect. The use of AI chatbots in this context remains experimental and should be regarded as supportive tools rather than replacements for professional psychological care.

A low mood can last for hours, days, months, or even years. When a person experiences a tragedy in life, such as the death of a loved one, they may consciously remain in a depressed emotional state, thereby contributing to the formation of stable connections between neurons that activate during the experience of negative emotions and spread to other neurons (Ovsyannikova et al., 2024).

Therefore, depression can become a chronic emotional state. If a depressive mood is reinforced by negative thoughts, it becomes difficult to overcome.

Naturally, sadness and grief are normal reactions to the loss of a loved one, but it is necessary to activate internal and external resources to support psychological adaptation and maintain essential functioning. Feelings of anxiety can be managed. The autonomic nervous system consists of the sympathetic and parasympathetic nervous systems. The sympathetic system is responsible for activating the body's reactions, while the parasympathetic system inhibits them. It slows down metabolic processes and breathing rate. A person's emotional state affects their type of breathing. When a person feels worry, anxiety, or panic, their breathing rate increases, which leads to a faster heartbeat and a decrease in the blood's acid-base balance. This affects the excitability of nerve cells and, as a result, the person becomes more anxious. Reducing the number of breaths per minute slows the heartbeat, which leads to relaxation and calmness. Therefore, it is necessary to control one's breathing, for example, by using Tibetan practices. Tibetan monks have long learned to control their emotions and achieve inner harmony through proper breathing techniques (Perelygina et al., 2024).

To overcome fears, one cannot "bury their head in the sand"; it is necessary to face them directly. When a person avoids the source of fear, unpleasant feelings are temporarily dulled, but over time, worry and anxiety only increase. Therapy involves deliberately placing oneself in uncomfortable situations and becoming accustomed to them; this gradually reduces the hypersensitivity of the amygdala, and fear and anxiety begin to disappear. A person's associations start to change, allowing them to see positive aspects in situations that previously caused discomfort. Engaging reflective thinking through structured cognitive reappraisal procedures and realistic threat assessment promotes more effective emotional regulation. This approach, rather than superficial self-soothing, also supports the development of adaptive coping strategies.

Depressive states are characterised by a shift in interhemispheric activation toward the right hemisphere of the brain. When the left hemisphere is suppressed, certain situations become incomprehensible and take on an emotionally negative tone. The left hemisphere primarily governs expressive and receptive language and specialises in processing tonic positive emotions, which create mood and emotional background. By giving one's narrative positive emotional colours that reflect one's attitude toward events, it is possible to potentially reprogram the brain toward positivity. Neural connections associated with these thoughts may be strengthened. Therefore, if a person's expressions are filled with negativity, it is necessary to change their thoughts.

Research shows that consciously verbalising one's emotions is an effective way to neutralise negative emotions, as it reduces amygdala activity and strengthens neural connections that regulate affective state. This technique is used in cognitive therapy (Kurapov et al., 2023).

An innovative approach in this area is the use of AI chatbots for cognitive support: by analysing linguistic patterns in a user's speech, AI can detect signs of cognitive distortions and suggest "thought prompt-engineering" algorithms, helping the person transition more quickly to a positive narrative.

A positive mood is very important for brain rewiring. A simple smile can activate areas of the brain responsible for positive emotions. It is also useful to simply pretend to be happy, as the informational flow along the neural pathways moves from the brain to the face and back. Thus, when a person smiles or frowns, it evokes the corresponding feelings: happiness or sadness (Khurtenko et al., 2021).

Sometimes, to overcome sadness, it is necessary to distract oneself, switch focus, and learn to approach everything with humour, which stimulates brain neuroplasticity and acts as a stress remedy, generating positive thoughts and feelings. Humour helps reduce cortisol— the stress hormone—and increases immunoglobulin levels, which support the immune system.

Therefore, it is important to watch more comedies and humorous shows that uplift mood.

However, spontaneously arising thoughts are difficult to reset. For this, a person's beliefs must be changed so that they reflect reality rather than their past experiences; negative personal attitudes must be replaced with positive ones; and positive thinking must be encouraged, as it is closely linked to mood.

5. Cognitive-Behavioural and Narrative Neurorehabilitation Strategies

One of the main approaches that yields positive results in treating depressive states is cognitive-behavioural psychotherapy. Its goal is to change thought patterns. A person becomes stuck in a stressful state due to cognitive traps, which are errors in thinking. They may perceive only the negative in every situation, generalise one unpleasant incident to their entire life, interpret every look directed at them as a hostile reaction, and view the world pessimistically, predicting only negative outcomes. In such cases, it is necessary to change one's thinking, focusing not on limitations but on potentials. This allows new neural connections to form in the brain instead of unused connections that reinforce negative emotions, enabling brain rewiring (Onishchenko et al., 2024).

Thinking and the power of belief have a significant impact on a person's emotional state. Research on placebo responses at the University of Toronto, based on brain physiology, showed that patients suffering from depression who took a placebo but believed it was a potent antidepressant experienced improvement, which was associated with changes in glucose metabolism in the brain. The placebo effect generated both physiological and psychological responses. Therefore, what one believes has a profound influence on one's physiological state (Kokun, 2023).

Overcoming stressful situations requires the creation of a positive narrative. The narrative approach is often used in psychotherapy. By recounting their life events, a person can find solutions to problems and view them from a different perspective. This approach helps individuals independently solve their problems and avoid resigning themselves to a negative self-image (Singh et al., 2021).

Using generative AI to create therapeutic narratives allows patients to restructure traumatic experiences through externalised narrative formats. This reflective process can support emotional processing and promote neuroplasticity (Wan et al., 2025).

Narrative practice separates the person from their actions, helping them understand that it is not the person who is bad, but only their behaviour, thereby improving emotional state and fostering a sense of safety. To turn potential into reality, ambition is necessary as an emotional fuel. It is important to cultivate healthy ambitions that are neither aggressive nor exploitative (Chaban & Khaustova, 2022).

These ambitions involve awareness of goals, the desire to achieve them, self-realisation, and curiosity. As social beings, people benefit emotionally from the support of others. Empathy engages mirror neurons. While traditional models have focused on functional asymmetry between the hemispheres in emotional regulation, modern neuroscience views states of disengagement and active engagement as the result of dynamic interactions between distributed neural networks. These states are therefore not attributed to the isolated activation of individual cortical areas. Despite the desire to be alone, such a person needs social engagement and active participation in life to change their emotional state. They must learn to transform irritations into proactive steps aimed at changing the situation itself, which improves well-being. This is one of the most effective means against depression. Physical activity is also a method to combat depression. As previously noted, in depressed individuals, the left frontal lobes are underactive; the left hemisphere generates positive emotions and is responsible for physical activity, while the right hemisphere produces negative emotions and passive behaviour. Therefore, inactivity worsens depression, while active physical engagement helps reduce its severity. To shift one's negative emotional state, one must engage in meaningful activities (Kokun, 2023).

Exercise acts as a natural antidepressant, directly influencing both physical and emotional symptoms of stress. During active movement, blood is enriched with oxygen, delivered to the brain, inducing a sense of calm and vigour. Levels of noradrenaline increase, improving mood; serotonin levels rise (low serotonin is linked to depression and anxiety); neural resilience strengthens; and brain neuroplasticity increases (Kokun, 2023).

Thus, sports and active physical engagement help prevent the harmful effects of chronic stress, providing energy and a positive mood.

Additionally, proper brain function depends on healthy biochemical processes and balanced nutrition. Skipping breakfast increases cortisol levels, leading to heightened stress reactivity, mood instability, and depression.

Studies involving elementary school children in Baltimore and Philadelphia showed that children who missed a full breakfast were twice as likely to suffer from depression and four times more likely to experience anxiety attacks than other students (Murphy et al., 1998).

Research also confirms a link between depression and an imbalance of omega-6 to omega-3 fatty acids. Therefore, besides proper amino acids, vitamins, and minerals, a person should include omega-3-rich foods or supplements in their diet to support a positive emotional state (Zbitnieva et al., 2024).

Based on this analysis, a comprehensive conceptual framework for recovery can be formulated. The systemic nature of neurorehabilitation involves simultaneous interventions across multiple levels of personal functioning (see Table 3).

It is important to emphasise that balanced, proper nutrition lays the foundation for combating stress, depression, and anxiety, on which emotional and cognitive rewiring can be built.

Table 3. Multilevel Model of Neurorehabilitation in Psychotraumatising Situations

Level of influence	Main tools / practices	Expected neurophysiological effect
Physiological	Breathing exercises, physical activity, Omega-3, sleep routine	Cortisol reduction, stabilisation of the autonomic nervous system
Cognitive	CBT, thought prompt engineering, reframing	Rewiring of prefrontal cortex neural connections
Narrative	Emotional articulation, positive narrative	Reduction of affect through activation of left-hemisphere language centres
Social	Empathy, volunteering, support groups	Activation of mirror neurons, overcoming isolation

Source: The authors' own conception

Legend to Table 3

CBT – cognitive behavioural therapy.

Prompt thought engineering – a conceptual approach to structuring internal dialogue through the use of AI-assisted prompts or cognitive reframing techniques to facilitate the identification and modification of maladaptive thought patterns.

Mirror neurons – neurons that are activated both when an individual performs an action and when they observe another person performing the same or a similar action. They are thought to contribute to action understanding, observational learning, and aspects of social cognition, although their role in empathy remains under investigation.

Omega-3 fatty acids – essential polyunsaturated fatty acids that contribute to the maintenance of neuronal membrane integrity and normal synaptic function.

The model demonstrates that neurorehabilitation is not linear – it requires the synergy of physical actions, mental effort, and modern technological tools. As seen in Table 3, each practice has a specific neurobiological response, allowing an individual to consciously manage the recovery process.

Thus, to overcome depression and cope with stress, one should first open the blinds in their apartment, let in more light, consciously focus on a positive mood, make an effort, and move from passivity to active actions, including proper nutrition and physical exercise. Engaging artificial intelligence as a personal neurorehabilitation assistant allows one to objectify progress and timely adjust self-help strategies.

Even if one feels unmotivated and wants to be alone, it is important to meet friends and go out with them, for example, to the cinema. It is necessary to cultivate optimism, strive for active engagement, and practice positive narratives. By developing positive thinking and fostering supportive social connections, one will maintain a new positive mood and feel comfortable. The systematic use of adaptive coping strategies and cognitive interventions contributes to the transformation of short-term positive emotional states into long-term affective stability.

6. Ethical Aspects of Neurorehabilitation in Wartime

Implementing the concept of neurorehabilitation and self-help requires adherence to strict ethical standards, especially in the context of armed conflict, where personal vulnerability is heightened. A fundamental principle is autonomy and voluntariness, according to which any practices of "brain reprogramming" or changes in cognitive patterns must be conducted exclusively with the individual's informed consent. Self-help should not become external pressure to maintain obligatory optimism, as the right to experience grief, anger, and pain is an inherent human right in traumatic conditions. An important ethical boundary is the differentiation between self-regulation methods and conditions meeting clinical PTSD criteria (Rektor et al., 2023).

Particular attention should be given to ethical challenges related to the use of artificial intelligence in neurorehabilitation. AI algorithms must be applied transparently, with guarantees for the protection of personal biometric and cognitive data. It is necessary to avoid "algorithmic bias", where AI systems may offer standardised solutions without considering the unique cultural and individual context of wartime trauma in Ukraine.

Furthermore, AI tools should remain supplementary, not replacing human empathy and professional oversight, to prevent the dehumanisation of the recovery process (Senoussaoui & Rahmani, 2026).

Promoting self-help methods should in no case replace professional medical or psychiatric care for severe clinical disorders that require pharmacological intervention. Additionally, work with narrative practices demands maximum sensitivity regarding confidentiality and safety. Public disclosure or discussion of trauma stories without appropriate professional support carries a high risk of retraumatisation for both the narrative authors and the audience.

7. Conclusions

Thus, depression and persistent anxiety in wartime are not simply a "bad mood" or "a weakness of character". They are real physical changes in the functioning of our brain. Chronic stress may cause dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis, characterised by persistent elevation of glucocorticoid levels and disruption of GABAergic and serotonergic neurotransmission.

However, the human brain is incredibly flexible. Even if stress has damaged areas responsible for memory and self-control, one can repair them through neuroplasticity. It is similar to building new roads around the destroyed ones: proper nutrition, physical activity, and work with one's thoughts allow one to create new neural connections.

The application of artificial intelligence (AI) in neurorehabilitation represents a promising area of research. However, claims that AI can predict depression before symptom onset or accurately detect neurochemical imbalances remain premature and require rigorous clinical validation. At present, AI should be regarded only as an adjunctive tool for early monitoring and cognitive support.

Effective neurorehabilitation requires a differentiated, evidence-informed approach. The choice of intervention should reflect the strength of the available evidence. Well-supported approaches, such as cognitive behavioural therapy (CBT) and regular physical exercise, should be distinguished from supportive interventions (e.g., breathing exercises and nutritional strategies) and experimental approaches, including AI-assisted tools.

The most effective approach is holistic. Simply taking vitamins or visiting a psychologist is not enough – it is necessary to act on all levels: from breathing exercises to social interaction with loved ones and volunteering.

Even during wartime, one can be the "architect" of one's own state. By consciously managing one's actions, nutrition, and thoughts (using AI as a smart assistant), one is literally rewiring the architecture of one's brain. One replaces the "just survive" mode with the "live fully" mode.

Statement on the Use of Artificial Intelligence

The authors confirm that artificial intelligence (ChatGPT, OpenAI) was used to research ideas, improve readability and language, and conduct online searches via large language model (LLM)–enhanced search engines. The final interpretation of results, formulation of conclusions, and scientific generalisations were carried out exclusively by the authors.

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