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COGNITIVE REAPPRAISAL, AFFIRMATION, AND EMOTIONAL INTEGRATION AS MECHANISMS ENHANCING THE EFFECTIVENESS OF PSYCHOTHERAPY: A NEUROPLASTICITY PERSPECTIVE

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ABSTRACT

The aim of this paper is to present mechanisms that may strengthen the process of psychotherapy, taking into account the neuroplasticity of the brain. The paper discusses issues of cognitive reappraisal, affirmation, and emotional integration, emphasizing their influence on neuronal remodeling and the durability of therapeutic effects. A literature review was conducted using PubMed and Google Scholar databases, including studies published between 2006 and 2025 in English and Polish. The analysis focused on neurological, imaging and clinical research exploring how psychological interventions induce measurable brain changes. Results indicate that both psychotherapy and pharmacotherapy contribute to neuroplastic modifications, particularly within the prefrontal cortex, hippocampus and limbic structures, which correspond to improved emotion regulation and cognitive processing. Furthermore - optimism and positive self-affirmation appear to reinforce adaptive neural patterns and enhance therapeutic outcomes. These findings suggest that the integration of neuroplastic principles into psychotherapeutic practice may strengthen resilience, promote emotional balance and improve long-term treatment efficacy.

KEYWORDS

Psychotherapy, Neuroplasticity, Affirmation, Cognitive Reappraisal, Emotional Integration

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Introduction

Psychotherapy is a method of treatment initiated by Sigmund Freud. Currently, various approaches can be distinguished - cognitive-behavioral therapy, psychodynamic therapy, interpersonal therapy, solution-focused therapy, and supportive therapy (2). Despite the differences among therapeutic schools, no major differences in effectiveness have been observed between them - each form of therapy is acceptable, similar to standardized treatment (2). However, cognitive-behavioral therapy has been suggested as the first line of treatment in the case of anxiety disorders (2), and cognitive-behavioral therapy for somatic disorders (16). Importantly, patients with depression prefer psychotherapy over pharmacological treatment (4). The lowest effectiveness of psychotherapy was observed in children with depression, and the highest in young adults (1). Brain activity can change depending on stimuli and emotions (28). Particular importance is attributed to the definition of "neuroplasticity," which was introduced in 2000 by Eric Kandel, who received the Nobel Prize for this discovery (10). He demonstrated synaptic plasticity in the sea slug Aplysia, thus confirming Hebb's rule. The mechanism of this principle involves the activation of one neuron leading to the stimulation of another - the pre- and postsynaptic neurons. Together they form a network, which, the more it is stimulated, the stronger the consolidation (10,26,30,39). Following Hebb's rule, the brain is an organ capable of continuous development through the creation of new connections between neurons - we are shaped by our environment: people, religion, and culture. Even minor changes are perceived by the nervous system. Elaine Fox aptly described the brain as optimistic or pessimistic - if anxious behaviors are constantly repeated, the mind may adopt a pessimistic stance (10). A similar assumption underlies positive psychology, which builds the foundations of well-being (13). Its main premise is positive thinking and behavior, practicing gratitude, mindfulness, appreciation of the present moment, and kindness (12,13). Importantly, the effectiveness of this approach has been demonstrated - it reduces depressive symptoms and improves functioning in society and among patients with chronic diseases (13). It is also used among healthcare professionals (12). One of the elements of positive psychology is affirmation. Affirmation is a technique of autosuggestion based on repeating short sentences. It is suggested that it can improve well-being, increase prosocial behavior, and enhance compassion (32).

Methods

The literature review was conducted using PubMed and Google Scholar databases. The keywords "neuroplasticity," "psychotherapy," and "affirmation" were used. The search included publications from 2006 to 2025, available in English and Polish. The inclusion criteria were:

(1) studies describing the relationship between psychotherapy and neuroplasticity,

(2) publications addressing mechanisms of cognitive reappraisal, affirmation, or emotional integration, and

(3) clinical, experimental, imaging, or review studies.

Exclusion criteria included

(1) studies focusing solely on pharmacological treatment,

(2) commentaries, editorials, and unpublished materials. A total of 39 articles were analyzed. The analysis was descriptive and qualitative, considering neurobiological, psychological, and clinical findings.

Results

Analysis of the selected 39 publications allowed for the identification of several recurring themes. Neuroimaging studies demonstrated that effective psychotherapy leads to changes in brain activity in structures responsible for emotional regulation and cognitive processes, particularly in the prefrontal cortex, hippocampus, basal ganglia, and amygdala. These changes were observed after both cognitive-behavioral and psychodynamic therapy. The mechanisms of cognitive reappraisal and emotional integration promote the reduction of rumination, increased emotional awareness, and improved adaptive responses. Activation of the dorsomedial prefrontal cortex and reduced amygdala activity were characteristic of successful emotional regulation. Affirmation and autosuggestion play a role in shaping a positive self-image and enhancing motivation. Studies have shown activation of brain regions associated with the reward system - the ventral prefrontal cortex and ventral striatum - during the repetition of affirmations. Comparisons between psychotherapy and pharmacotherapy show that both methods produce similar neuroplastic changes, including normalization of limbic structures and improved cognitive-emotional integration. Most studies also emphasize the importance of optimism and positive thinking as factors that strengthen therapeutic outcomes and facilitate recovery.

Discussion

Neurobiological Foundations of Cognitive Reappraisal and Emotional Integration in the Psychotherapeutic Process

Cognitive reappraisal is one of the best-known emotion regulation processes - it involves transforming a negative feeling to minimize its emotional impact. It has been shown that psychotherapy may be useful not only in treating mental disorders but also physical pain, where cognitive-behavioral therapy, stress reduction, and acceptance therapy were applied (5). MRI studies have confirmed that effective psychotherapy leads to changes in the basal ganglia, prefrontal cortex, hippocampus, amygdala, and inferior parietal lobe (10,28). Researchers suggest that therapy should begin with education - increasing patient awareness that pain is a complex process and that understanding the therapeutic goal is crucial for effective treatment (5).

The most common mental disorders include mood disorders such as depression or anxiety and substance addiction (6). Interestingly, literature increasingly reports on the use of psychedelics under controlled conditions in psychotherapy, particularly in the psychodynamic approach (17). These studies suggest that such substances have the potential to reveal primary, unconscious processes - similarly to dreams (17).

In depression, reducing negative emotions is necessary for emotional control, while enhancing positive emotions helps combat stress and facilitates recovery (33). Cultural and ethnic factors significantly influence therapeutic processes and effectiveness. In Eastern cultures, emotional suppression is encouraged to maintain social harmony and is better tolerated than in Western cultures, hence cognitive reappraisal may be less effective among Asians (25). People with depression may have difficulty regulating emotions due to impaired emotional processing (22). Studies indicate a correlation between emotion processing and cognitive processes (22). Another cause of emotional dysfunction may be the interaction between working memory and emotional acceptance (22). Difficulties in emotion regulation are associated with negative thinking, memories, and rumination (22). Patients learn to identify and understand emotions and develop mindfulness.

Emotional integration involves connecting emotions with conscious experience and acceptance. Cognitive reappraisal involves transforming an uncomfortable situation into a new, adaptive meaning - rather than avoiding emotions, their function is changed; for example, a threat becomes a challenge or opportunity

for growth (23,27,28). Cognitive reappraisal is linked to reduced negative feelings. Brain activity observed during this process involves the dorsomedial and dorsolateral prefrontal cortex and posterior parietal cortex, along with reduced activity in the bilateral amygdala (21,29). Two types of reappraisal have been proposed: reinterpretation and distancing (21). In case of distancing - activation of parietal areas was observed (21). During reinterpretation, the suppression of rumination phenomena was observed (24,30). Rumination involves recurring, intrusive thoughts or emotions, which can contribute to negative mood and increased anxiety or stress. It typically focuses on past events and leads to self-criticism. It is observed, for example, during the review of traumatic experience as a symptom of PTSD (11). A study was conducted on the effectiveness of cognitive behavioral therapy and cognitive processing therapy in veterans with PTSD. The conclusions are as follows: the participants showed improvement in symptoms, it was indicated that cognitive processing therapy (CPT) and prolonged exposure therapy (PE) are effective in clinical settings, and that in practice, other factors, such as the presence of other disorders, regularity of meetings, and less control over the quality of therapy, may influence the effectiveness (7). Therefore, further research is needed to improve treatment methods.

Difficulty in synchronizing internal expectations of a goal with one's self-beliefs can lead to frustration. Reduced activity in the parietal region has been observed in anxiety disorders (including PTSD) (29).

Neuroplasticity of the Brain

The concept of “neuroplasticity” began to be studied in the 1940s. Currently, neuroplasticity refers to the brain's ability to change as a result of learning, emotions, or therapy (10,39). Both internal and external factors influence neuroplasticity. A good example of this definition is telling yourself that you're not good enough in a given field. When the brain hears the repeated information, it encodes and amplifies it. Another example is the function of excised brain tissue taken over by another brain region in people who have undergone hemispherectomy to treat drug-resistant epilepsy (10), or in the developing brain, removal of the visual part causes the auditory cortex to begin receiving visual stimuli (39).

It has been shown that the child's brain is more plastic than that of an adult. This may be due to favorable synaptogenesis, the formation of connections between neurons (10), which allows the brains of younger patients to adapt more easily to new conditions. Furthermore, levels of BDNF, or brain-derived neurotrophic factor, are very high. This protein aids in the formation of synapses and promotes the consolidation of existing ones. However, this does not mean that adults lack this ability. Patients after stroke can restore impaired function, such as speech or difficulty moving a limb, through effective rehabilitation (10). However, plasticity decreases with age, due to decreased expression of genes related to synaptogenesis, the synthesis of receptor cells, and the intercellular matrix (39).

There are two neuroplastic mechanisms: structural and homeostatic (39). The structural mechanism involves the formation of new connections between synapses, which can change their shape and lead to the growth of neurons or glial cells. The homeostatic mechanism, on the other hand, will strengthen or weaken existing connections, and its main function is to ensure the neuron's ability to respond to stimuli (10,37). Both mechanisms can occur in the same neuron. In adults, neurogenesis occurs in the subgranular zone of the dentate gyrus and in the subventricular zone adjacent to the caudate nucleus and striatum (37). In the case of learning, the white matter of the brain is modified and the level of myelination changes (37).

Similarly, in the case of psychotherapy, repetition leads to the formation of new neural networks and the consolidation of existing ones. Similar processes occur in different therapeutic approaches, and it has been shown that each can be effective (2). In patients with schizophrenia, cognitive exercises have been shown to change the prefrontal cortex, bringing it closer to the brain of a healthy person (10). In depression, hyperactivity was observed in the middle occipital gyrus, insula, and postcentral gyrus, compared to a group of healthy patients (33). In obsessive-compulsive disorder and cognitive-behavioral therapy, decreased metabolism was observed in the right caudate nucleus, and in phobia, decreased activity in limbic and paralimbic areas (18).

An example illustrating the comparison between psychotherapy and pharmacology is the experience with patients with compulsive handwashing. Two methods were used: one group of patients used fluoxetine, the other group underwent behavioral therapy sessions, where they were subjected to unpleasant practices, such as standing next to a sink and not being able to wash their hands (10). At the same time, they were instructed to challenge intrusive thoughts. Both methods proved effective (10).

It was also found that there were no significant differences in effectiveness between the different types of therapy - each involved similar mechanisms: belief modification, reinterpretation of experiences, reconsolidation of cognitive memory, and consolidation of new patterns (3). Psychotherapy, like pharmacotherapy, induces brain changes. It was found that limbic structures and the prefrontal cortex

normalized (10). In behavioral psychotherapy, changes were observed in the basal ganglia, amygdala, and hippocampus (10). In cognitive psychotherapy, the prefrontal cortex was stimulated; in psychodynamic psychotherapy, the cortical-subcortical region was stimulated (10). It has been observed that physical activity is strongly correlated with the mechanism of neuroplasticity and can enhance it (37). This may be further evidence why children have greater plasticity than older patients. Physical training, particularly aerobic exercise, can increase neurotrophin levels, which enhances the neuroplasticity process (37). It has also been shown that neurotrophic growth factors can be enhanced by vascular endothelial growth factor (VEGF) and insulin-like growth factor 1 (IGF-1) (37).

Repetition of Positive Content and the Power of Affirmation as a Mechanism for Reinforcing Therapeutic Change

An affirmation is a short sentence used to change beliefs and attitudes to a more positive one. When perceived competence is threatened, resistance is put forward (31). It influences the individual's well-being, supports a positive self-image, helps reduce stress, opens one to new experiences, teaches dialogue with oneself, and enhances well-being (8,13,14,31). Compared to affirmation, self-affirmation focuses on affirming one's self-worth - it encourages reflection on one's morality (31). However, the basis is autosuggestion, where affirmations are an indirect tool (38). It is a cognitive process intended to build resources that promote life satisfaction (13,38). It involves repeating ideas internally or aloud, picturing a given goal. Often, a given desire may seem impossible or contradictory to the present - therefore, it is important to visualize a specific effect (38). There are ongoing debates about whether the mind can influence perceptual states (perception of external stimuli). For example, placebo can influence functional activation and pain threshold (38). There is now evidence that cognitive states can influence neurophysiology in the spinal cord, subcortical structures, and primary sensory cortices (38).

Another interesting issue is interoception - the ability to perceive internal stimuli. This process primarily occurs outside of consciousness and can be experienced as affect (20). Affect, on the other hand, serves to assess the patient's expression (20).

In an era of numerous stressors, it is difficult to maintain a consistent self-perception. People tend to have low self-esteem, be critical, engage in perfectionism, or procrastinate, and question their abilities. They lack self-acceptance. In addition to psychological factors, changes in the biochemical panel have been observed: increased cortisol secretion and the activity of proinflammatory cytokines: IL-6 and IL-1β (8). The statistics are alarming - according to the WHO, depression is a significant cause of dysfunction, and currently over 280 million people suffer from it (13, World Health Organization 2023). Another disturbing fact is that the WHO statistically estimates that 700,000 people commit suicide each year (World Health Organization 2023 - 35). In the UK, a correlation between self-harm and subsequent suicide has been observed (15). The problem may have worsened in 2020 due to the COVID-19 pandemic, which also impacted the availability of medical facilities and treatment options. Studies have shown that the incidence of depression has increased during the pandemic, which may be due to increased stress, isolation, and fear of illness (22). Difficulty accessing treatment may also be linked to socioeconomic status, stereotypes, and lack of education about mental illness; ethnic minority backgrounds, where the very existence of the illness may be unacceptable to the community (9). It is worth noting that in clinical care, women and men experience differences in their problems - in the United States, women are more likely to struggle with depression, eating disorders, and anxiety. They are also more likely to be victims of sexual assault and domestic violence (9).

Due to these unfavorable factors, it is important for the body to develop appropriate defense mechanisms. The following mechanisms have been suggested: accepting the threatening situation and solving the problem, downplaying the problem, or self-affirmation focusing on the individual's strengths (8).

The premise of affirmations focuses on recognizing positive aspects of oneself and maintaining cognitive integrity. Self-affirmations have been shown to be associated with greater happiness and hope, as well as the satisfaction of one's sense of being and needs (8). Affirmations are believed to be effective by broadening the patient's perspective. They remind them of social problems and awareness of their strengths as a source of self-esteem, thus reducing their focus on threats (31). Their purpose is self-affirmation, encouraging self-reflection on values and experiences. Positive self-talk has been proven to increase joy and commitment to change, whereas negative self-talk contributes to low self-esteem or criticism (14). The role of self-talk has various functions: self-regulation, reflection, decision-making, future planning, impulse control, and memory. It can also serve as a foundation for building emotional well-being and contribute to success by building self-confidence, health hygiene, and motivation. Repeating affirmations is intended to bring one closer to a goal (14). The brain region responsible

for engagement and positive evaluation was found to include the ventral medial prefrontal cortex and the ventral striatum. Information processing, on the other hand, involves the medial prefrontal cortex and the posterior cingulate cortex, while emotion regulation and difficult decision-making are mediated by the ventrolateral prefrontal cortex and the anterior cingulate cortex (31). It can be suggested that this is a type of persuasion technique. It was shown that thinking about the future and events related to it evokes satisfaction and positive emotions for the patient, which was associated with changes in the ventromedial prefrontal cortex, striatum, the middle prefrontal cortex, and the posterior cingulate cortex. Systematic repetition can be a healing factor (10). Simultaneous thinking about the future and self-affirmation are based on similar mechanisms and can reinforce each other. An example is comparing an imagined scenario with past events. Such simulations, focusing on the future and plans, positively impact well-being and goal setting (31).

It has been suggested that affirmations can influence the reward system.

The concept of optimism and how it can influence health is also worth considering - according to Martin Seligman, in four ways. It influences the feeling of helplessness, or more precisely, counteracts it - correlations have been noted with a weakened immune system. Optimists are more likely to use preventative measures because they believe they can influence their health. The third way concerns events: it has been shown that pessimists experience unpleasant situations more often; support from the environment - pessimists are less likely to ask for support in difficult situations (19). Optimism promotes coping with stress. Optimists have been shown to recover faster (19). It has been shown that the use of cognitive therapy in a pessimist with a somatic illness, changing their beliefs towards more optimistic ones, resulted in an enhanced immune system activity. It is worth noting that optimists have lower cortisol levels (19).

The role of autosuggestion is relevant to positive psychology (13). One technique used in cognitive-behavioral therapy and positive psychology is journaling, where individuals record personal thoughts, reflections, observe their behavior, and set life goals (11). This method has been found to be beneficial in treating anxiety, depression, and post-traumatic stress disorder. It has been argued that clarifying the meaning of events and overcoming them facilitates the process of acceptance and gaining perspective (11). It is important for the patient to be completely honest in their writing. The issue is similar in the case of creating one's own identity - this method involves assigning narratives to certain events that are perceived as culminating, giving meaning to existence, and characterizing a person's life (11). As a result, the patient recognizes themselves as the author of experiences and develops a sense of personal agency (11) - this is the belief in the ability to influence situations and shape reality through their own decisions. Other methods for enhancing happiness include: "Three Good Things," the best version of "I," or, with the help of the internet, "Inter-apy" (11).

An interesting issue is the understanding of quantum physics in the functioning of the subconscious (34). It is possible that with the development of quantum theory, the mechanism of creating consciousness, making decisions, and transmitting information will soon be explained (34). Researchers have attempted to use quantum state reduction to interpret the brain. The concept of "quantum state reduction" is used in the decision-making process, while in medicine, in neurology, for example, in Alzheimer's disease (34).

An intriguing experiment conducted by scientists at MIT is the "Double Slit" experiment. Using a slit the thickness of an atom, physicists wanted to test whether the observer effect (36) could be bypassed. The observer effect relates to time and space. It is assumed that the mere act of observing changes a given object or mechanism. In quantum physics, it can influence particle changes, and in psychology, it can influence human behavior. Similarly, it can apply to affirmations, and the famous Buddha quote, "What you think, you become. What you feel, you attract. What you imagine, you create," takes on a new meaning. There is still much to discover in the field of quantum physics, hence the need for more research.

Conclusions

Despite differences among therapeutic schools, all aim for the same outcome: change in thinking, interpretation, and adaptation. Neuroplasticity is the proof, that the brain can develop and psychotherapy facilitates this reprogramming mechanism. Importantly, effective psychotherapy leads to the reorganization of neural connections, modifications in information processing and strengthening of new emotional patterns. Cognitive reappraisal, affirmation, and emotional integration can work together to enable a shift in perception of oneself and one's surroundings. Optimism has been shown to facilitate functioning and foster favorable conditions, while pessimism robs one of joy in life. Affirmation can strengthen self-esteem, promote acceptance, and reduce stress - which can contribute to improved emotional and social functioning.

It has been observed that psychotherapy and affirmation activate the same brain regions responsible for emotion regulation and the sense of reward. Changes in the activity of the prefrontal cortex, hippocampus, and basal ganglia confirm that the process of mental recovery has a neurobiological basis. Therapy works not only at the cognitive level but also structurally by creating new synapses and strengthening existing neural networks. A similar observation has been made with affirmations - the repetition of positive content can contribute to memory reconsolidation and the consolidation of better cognitive patterns.

From a psychological perspective, it strengthens mental resilience and contributes to mental well-being. This will also result in greater self-acceptance, gratitude, and openness. It's worth mentioning the personal development process, which will result from working on oneself, contributing to improved life satisfaction.

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