

PTSD and Neurofeedback

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Post-traumatic stress disorder, commonly known as PTSD, affects the lives of thousands of individuals around the world. Common symptoms include severe anxiety, emotional detachment, and flashbacks (National Institute of Mental Health, 2016). Insomnia and nightmares have also been present in many PTSD cases, as well as self-destructive behavior. PTSD can present itself in all ages following a traumatic event. In fact, neuropsychological research has proven that catecholamine levels, such as dopamine, epinephrine, and norepinephrine, following a traumatic event can obstruct brain region development, which can have negative effects on the cognitive functioning of those affected (Mulvihill, 2005). In other words, if the brain is subject to a prolonged state of hyperarousal it can develop maladaptive neural networks and victims may be more prevalent to mental illnesses (Felitti et al., 1998) and cognitive deficits (Navalta et al., 2006) later on in life. Using advanced technology, De Bellis and colleagues have revealed that children suffering from maltreatment related PTSD have significantly smaller volumes in the cerebral and prefrontal cortex (responsible for planning, critical thinking, and personality development), temporal lobes (involved in memory and language), corpus callosum (responsible for transmitting neural signals between both hemispheres), and cerebellum (regulates muscular activity) (De Bellis & Keshavan, 2003; De Bellis and Kuchibhatla, 2006; De Bellis et al., 2002). It's evident that the effects of PTSD are both devastating and long-term without professional help and appropriate treatment.

Recent popular treatments for PTSD include cognitive behavioral therapy, eye movement desensitization, and exposure therapy. If symptoms are severe, patients may also be exposed to antidepressants like Selective Serotonin Reuptake Inhibitors, or better known as SSRIs, to relieve depressed moods and acute anxiety (National Institute of Mental Health, 2016). Some have discovered that traditional psychotherapy, although helpful in its own way, doesn't always get rid of all PTSD symptoms. Similarly, medication can also have its drawbacks. SSRIs may not have addictive characteristics but if treatment is stopped abruptly or doses are regularly missed patients may suffer from withdrawal-like symptoms such as dizziness, uneasiness, and flu-like symptoms. Antidepressants are also accompanied by an increase in suicidal thoughts, especially in the first few weeks after dosage starts. Negatives aside, medication has done a wonderful job in guiding patients towards a more manageable lifestyle. Some scientists, however, believe we can do better. Nowadays, clinicians are looking for an alternative therapy for those suffering from reoccurring PTSD symptoms.

In recent years, researchers have joined together to investigate an alternative therapy that, interestingly, is backed up by several decades' worth of research. Neurofeedback was first introduced to the scientific community in the late 1950's and early 60's through the work of both Dr. Joe Kamiya and Dr. Barry Sterman ("What is Neurofeedback?", n.d.). This practice is used to retrain the brain to achieve optimal brain function. In other words, neurofeedback is the

process of recording brain activity using electrodes and presented either visually or audibly so that the patient can acknowledge the state of the function being controlled. In this way, with enough exposure to treatment, patients can alter the generation of brainwaves. Brainwaves, or the communication between areas of our brains, are what drive our emotions, thoughts, and behaviors. Research shows that abnormalities in EEG and qEEG are more often found in individuals with anxiety (Small, 1993). Alpha waves, ones present while we are both awake and relaxed, have been reported to be low through the use of EEG on patients with anxiety. In addition, low theta waves can also very much affect, if not worsen, the conditions of an anxiety patient. Theta waves refer to the wave pattern that is present during deep meditation, hypnotic or sleeping states, and drowsy states. Alpha-theta wave training has manifested itself as one of the most useful treatment in the realm of PTSD (Walker, 2009).

In a V.A. hospital uncontrolled study (Peniston, Marrison, Deming, & Kulkosky, 1993) 20 Vietnam veterans suffering from chronic PTSD along with comorbid alcohol abuse were treated with thirty 30-minute sessions of protocols relating to occipital alpha-theta neurofeedback training. The protocols were used to bring alpha and theta wave activity in the occipital areas back to optimal levels. In the end, only 4 of the 20 patients complained of occasional reoccurrence of nightmares or flashbacks, and the other 16 had no reoccurrence of any PTSD symptoms. Similarly, Walker proved that quantitative EEG is not only usable in the diagnosis of PTSD but also in the neurofeedback training of anxiety remediation (2009). 19 patients were exposed to 5-7 neurofeedback sessions for each and every site with excessive high frequency beta. 4 subjects who declined neurofeedback training were also included in the study as part of the control group. Post-treatment anxiety levels decreased in all 19 patients subjected to neurofeedback training and continued to stay significantly low at the 1-month check-in. None of the patients in the control group saw a decrease in PTSD-related anxiety levels after the study or at the 1-month check-in.

Furthermore, a randomized controlled study consisting of veterans with PTSD (Peniston & Kulkosky, 1991) aimed to use neurofeedback in occipital alpha/theta training along with the use of traditional psychotherapy. The study resulted in improvement in all 10 Minnesota Multiphasic Personality Inventory (MMPI) scales, whereas those treated with psychotherapy alone did not show any significant improvement. During a period of 26 months, a mere four of the neurofeedback patients experienced reoccurrence of PTSD-related nightmares or occasional flashbacks. At the 26-month follow-up, all 14 traditionally treated patients had experienced some sort of relapse, whereas only 3 out of 15 neurofeedback patients experienced relapse symptoms under the PTSD criteria.

It is evident that the human brain is one of the most complex organs in the human body. In the past, medication and traditional psychotherapy were regarded as the only ways to tackle mental health illnesses. Studies like these, however, are shining a spotlight on the field of neurofeedback. It's been shown to decrease symptoms of PTSD and many other mental health troubles. Past and ongoing current research supports neurofeedback's credibility, and with the

right equipment along with trained professionals this may become the preferred therapy for depression, ADHD, anxiety, PTSD, and many more.

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