

Neurofeedback

Neurofeedback is a form of biofeedback that examines the brain, identifies areas of dysregulation, and promotes healing and improved performance. Our brains have regions responsible for attention, relaxation, mood, and coordination. By changing our brain activity, anyone can improve their brain. Although neurofeedback is used to treat a variety of emotional, behavioral, learning, and medical disorders, it's also used to enhance performance in academic, corporate, and athletics settings. Developed and refined over the course of several decades, neurofeedback has gained increased attention for its ability to safely and effectively improve mental health and wellbeing.

How does it work?

Neurofeedback starts by obtaining a full analysis of brain functioning through use of a quantitative electroencephalogram, or qEEG. People with various diagnoses such as ADHD or PTSD may have similar symptoms, yet the affected region of the brain may differ. Thusly, the qEEG identifies the specific areas of brain regulation and dysregulation and guides neurofeedback clinicians to the source of specific health disorders. This makes it possible to address and resolve the specific brain abnormalities unique to each individual and, in turn, to resolve their given symptoms. The qEEG is collected by placing a cap of EEG sensors on the top of the head, which records and analyzes brainwaves at 19 brain locations. The assessment is painless, non-intrusive, and takes less than an hour to complete. These measurements are then compared to an age-normed database and used to develop a summary report for the individual.

Once analysis of the data is complete, the next step is to retrain dysfunctional brain patterns through visual and auditory feedback mechanisms. Sensors are attached with paste to the client's scalp. These sensors allow for the direct observation of brain waves on a computer screen. Changes in these brain waves are then fed back to the client via a game or video. The participant learns to make changes in the game's display by concentrating their attention on the video game or movie. Similarly to learning how to ride a bike, the brain learns how to succeed at the game or video. As the person learns to make changes on the screen, they simultaneously make changes to their brain waves. Changes in brain waves can yield changes in symptoms of a disorder in a matter of hours or even minutes following a training session. Over the course of 40-60 sessions on average, the brain learns how to self-regulate until neurofeedback is no longer needed to elicit the positive changes.

How is it different from other approaches?

- Therapy, tutoring, and learning software helps you change your thoughts or behavior.
 - Medications alter the amount of neurotransmitters in your brain.
- Neurofeedback changes your brain itself. It changes the timing of your brain's neuronal firing rate to be more efficient and balanced. Over time, it builds and strengthens healthy neural pathways.
 - The benefits of neurofeedback last long after treatment has concluded.



What can Neurofeedback help with?

Research indicates neurofeedback is helpful in treating these following issues:

- ADHD/ADD
- Traumatic Brain Injury (TBI)
- Depression
- Anxiety
- Panic Disorder
- Bipolar Disorder
- Addiction/Alcoholism/Food Addiction
- Tobacco Cessation
- Post-Traumatic Stress Disorder (PTSD)
- Learning Differences (LD)
- Autism Spectrum/Aspergers • Dyslexia
- Oppositional/Defiant Disorder • Obsessive Compulsive Disorder • Headaches/Migraines
- Hypertension/Heart Conditions • Memory Enhancement
- Strokes
- Dementia
- Parkinson's Disease
- Fibromyalgia
- Chronic Fatigue Syndrome
- Tinnitus
- Epilepsy
- Sleep/Insomnia
- Pain
- Attention
- Mood/ Emotional Regulation • Body Tension
- Coordination
- Impulsivity
- Managing Anger
- Executive Functioning
- Cognitive Performance
- Peak Performance at
 - Work
 - School
 - Sports

*** Please see attached References Page for relevant peer-reviewed articles.***

Neurofeedback is:

- Fun! Participants often look forward to learning about their brain, watching a movie or playing a video game, and feeling better.
- Safe. All equipment is FDA approved. Neurofeedback is non-invasive, does not involve medication, and is backed by thousands of peer-reviewed research articles.
- Easy. Children as young as 3 and as old as 103 can successfully train their brain by merely paying attention.
- Client-centered. Participants set their own treatment goals, provide ongoing feedback, and are responsible for improving their own brains!
- Affordable. Neurofeedback sessions are priced at \$75/appointment. The one-time qEEG cost is \$350 for a mini-report or \$500 for a full report.



References

- Abarbanel, A. (1995). Gates, states, rhythms, and resonance: The scientific basis of neurofeedback training. *Journal of Neurotherapy*, 1(2), 15-38.
- Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management. (2011). ADHD: clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. *Pediatrics*, 128(5), 1007.
- Becerra, J., Fernandez, T., Harmony, T., Caballero, M. I., Garcia, F., Fernandez-Bouzas, A., ... & Prado-Alcalá, R. A. (2006). Follow-up study of learning-disabled children treated with neurofeedback or placebo. *Clinical EEG and neuroscience*, 37(3), 198-203.
- Breteler, M. H., Arns, M., Peters, S., Giepman, I., & Verhoeven, L. (2010). Improvements in spelling after QEEG-based neurofeedback in dyslexia: A randomized controlled treatment study. *Applied psychophysiology and biofeedback*, 35(1), 5-11.
- Dehghani-Arani, F., Rostami, R., & Nadali, H. (2013). Neurofeedback training for opiate addiction: improvement of mental health and craving. *Applied psychophysiology and biofeedback*, 38(2), 133-141.
- Fernandez, T., Herrera, W., Harmony, T. A., Diaz-Comas, L., Santiago, E., Sanchez, L., ... & Barraza, C. (2003). EEG and behavioral changes following neurofeedback treatment in learning disabled children. *Clinical Electroencephalography*, 34(3), 145-152.
- Fragedakis, T. M., & Toriello, P. (2014). The Development and Experience of Combat-Related PTSD: A Demand for Neurofeedback as an Effective Form of Treatment. *Journal of counseling & Development*, 92(4), 481-488.
- Frick, M. H., Curtis, R.C., Thompson, H., Li, Y., & Simpson, M. (in press). Working with developmental trauma: Results of neurofeedback training with adolescent females and counseling implications. *Journal of Counseling and Development*.
- Gevensleben, H., Holl, B., Albrecht, B., Schlamp, D., Kratz, O., Studer, P., ... & Heinrich, H. (2010). Neurofeedback training in children with ADHD: 6-month follow-up of a randomised controlled trial. *European child & adolescent psychiatry*, 19(9), 715-724.
- Haddadi, P., Rostami, R., Moradi, A., & Pouladi, F. (2011). Neurofeedback training to enhance learning and memory in patients with cognitive impairment. *Procedia-Social and Behavioral Sciences*, 30, 608-610.
- Haghshenas, S., & Rostami, R. (2011). Rehabilitation in Autism Spectrum Disorder (ASD): a mixture of neurofeedback training and Auditory Integration Training (AIT). *Procedia-Social and Behavioral Sciences*, 30, 611-614.
- Hammond, D. C. (2003). QEEG-guided neurofeedback in the treatment of obsessive compulsive disorder. *Journal of Neurotherapy*, 7(2), 25-52.
- Hammond, D. C. (2005). Neurofeedback with anxiety and affective disorders. *Child and Adolescent Psychiatric Clinics*, 14(1), 105-123. Hammond, D. C. (2005). Neurofeedback treatment of depression and anxiety. *Journal of Adult Development*, 12(2-3), 131-137.
- Hammond, D. C. (2011). What is neurofeedback: An update. *Journal of Neurotherapy*, 15(4), 305-336. DOI: 10.1080/10874208.2011.623090
- Kober, S. E., Schweiger, D., Witte, M., Reichert, J. L., Grieshofer, P., Neuper, C., & Wood, G. (2015). Specific effects of EEG based neurofeedback training on memory functions in post-stroke victims. *Journal of neuroengineering and rehabilitation*, 12(1), 107.
- Kouijzer, M. E., van Schie, H. T., de Moor, J. M., Gerrits, B. J., & Buitelaar, J. K. (2010). Neurofeedback treatment in autism. Preliminary findings in behavioral, cognitive, and neurophysiological functioning. *Research in Autism Spectrum Disorders*, 4(3), 386-399.

- Kouijzer, M. E., van Schie, H. T., Gerrits, B. J., Buitelaar, J. K., & de Moor, J. M. (2013). Is EEG-biofeedback an effective treatment in autism spectrum disorders? A randomized controlled trial. *Applied psychophysiology and biofeedback*, 38(1), 17-28.
- Lecomte, G., & Juhel, J. (2011). The effects of neurofeedback training on memory performance in elderly subjects. *Psychology*, 2(08), 846.
- Martin, B & Childre, M., (2000). *The Heart Math Solution*. Harper Collins Publishers.
- Micoulaud-Franchi, J. A., Geoffroy, P. A., Fond, G., Lopez, R., Bioulac, S., & Philip, P. (2014). EEG neurofeedback treatments in children with ADHD: an updated meta-analysis of randomized controlled trials. *Frontiers in human neuroscience*, 8, 906.
- Reiter, K., Andersen, S. B., & Carlsson, J. (2016). Neurofeedback treatment and posttraumatic stress disorder: Effectiveness of neurofeedback on posttraumatic stress disorder and the optimal choice of protocol. *The Journal of nervous and mental disease*, 204(2), 69-77.
- Ring, C., Cooke, A., Kavussanu, M., McIntyre, D., & Masters, R. (2015). Investigating the efficacy of neurofeedback training for expediting expertise and excellence in sport. *Psychology of sport and exercise*, 16, 118-127.
- Rostami, R., Salamati, P., Yarandi, K. K., Khoshnevisan, A., Saadat, S., Kamali, Z. S., ... & Rezaee-Zavareh, M. S. (2017). Effects of neurofeedback on the short-term memory and continuous attention of patients with moderate traumatic brain injury: A preliminary randomized controlled clinical trial. *Chinese journal of traumatology*, 20(5), 278-282.
- Othmer, S., & Othmer, S. F. (2009). Post traumatic stress disorder—the neurofeedback remedy. *Biofeedback*, 37(1), 24-31.
- Sokhadze, T. M., Cannon, R. L., & Trudeau, D. L. (2008). EEG biofeedback as a treatment for substance use disorders: review, rating of efficacy and recommendations for further research. *Journal of Neurotherapy*, 12(1), 5-43.
- Steiner, N. J., Frenette, E. C., Rene, K. M., Brennan, R. T., & Perrin, E. C. (2014). In-school neurofeedback training for ADHD: sustained improvements from a randomized control trial. *Pediatrics*, 133(3), 483-492.
- Thompson, M., & Thompson, L. (2003). *The Neurofeedback Book: An Introduction to Basic Concepts in Applied Psychophysiology*. Association for Applied Psychophysiology and Biofeedback.
- Van der Kolk, B. A. (2015). *The body keeps the score: Brain, mind, and body in the healing of trauma*. Penguin Books.
- van der Kolk, B. A., Hodgdon, H., Gapen, M., Musicaro, R., Suvak, M. K., Hamlin, E., & Spinazzola, J. (2016). A randomized controlled study of neurofeedback for chronic PTSD. *PLoS one*, 11(12), e0166752.
- Walker, J. E. (2009). Anxiety associated with post traumatic stress disorder—the role of quantitative electro-encephalograph in diagnosis and in guiding neurofeedback training to remediate the anxiety. *Biofeedback*, 37(2), 67-70.
- Walker, J. E. (2011). QEEG-guided neurofeedback for recurrent migraine headaches. *Clinical EEG and Neuroscience*, 42(1), 59-61.
- Wan, F., Nan, W., Vai, M. I., & Rosa, A. (2014). Resting alpha activity predicts learning ability in alpha neurofeedback. *Frontiers in human neuroscience*, 8, 500.
- Xiong, S., Cheng, C., Wu, X., Guo, X., Yao, L., & Zhang, J. (2014). Working memory training using EEG neurofeedback in normal young adults. *Bio-medical materials and engineering*, 24(6), 3637-3644.
- Yucha, C., & Montgomery, D. (2016). *Evidence-based practice in biofeedback and neurofeedback*. Wheat Ridge, CO: AAPB.