Biofeedback for Posttraumatic Stress Disorder

Psychological Health Center of Excellence Psych Health Evidence Briefs March 2021

Q. What is biofeedback?

A. Biofeedback is a technique in which individuals learn to voluntarily control physiological processes typically thought of as involuntary, such as heart rate, in order to improve their health (Frank, Khorshid, Kiffer, Moravec, & McKee, 2010). Trained biofeedback practitioners provide sensory cues (usually visual or auditory) and teach individuals to use that feedback to learn to regulate their physiology. Over time, individuals can generalize their learned self-regulation of physiology outside of the biofeedback sessions (Frank et al., 2010). Common types of biofeedback include surface electromyography (sEMG) and neurofeedback. sEMG biofeedback involves measurement of muscle activity and is used to relieve muscle-related issues such as tension headaches and chronic pain. Neurofeedback involves measurement of brain activity and is used to address neurological issues such as attention deficit hyperactivity disorder (ADHD) and epilepsy. Types of neurofeedback include electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). Biofeedback can also be used to monitor physiological activity such as heart rate, respiration rate, skin conductance, and heart rate variability, with the goal of reducing sympathetic arousal and treating hypertension, anxiety and other disorders made worse by stress (Frank et al., 2010). Recently there has been interest in applying biofeedback, in particular neurofeedback, to posttraumatic stress disorder (PTSD).

Q. What is the potential mechanism of action underlying biofeedback for PTSD?

A. Though biofeedback is an established treatment for certain disorders, research on biofeedback for PTSD has been limited. Multiple types of biofeedback are being investigated for use in the treatment of PTSD, each with their own proposed mechanisms of action. For instance, heart rate variability biofeedback is being studied for PTSD in an attempt to improve autonomic nervous system imbalance (Orr, Meyerhoff, Edwards, & Pitman, 1998; Lande, Williams, Francis, Gragnani, & Morin, 2010; Chalmers, Quintana, Maree, Abbott, & Kemp, 2014; Dennis et al., 2016). EEG neurofeedback for modification of brain activity and connectivity is being explored with the goal of improving affect regulation (Ros et al., 2012; Kluetsch et al., 2014; van der Kolk et al., 2016). However, little research currently exists on the use of biofeedback mechanisms for addressing PTSD.

Q. Is biofeedback recommended as a treatment for PTSD in the Military Health System (MHS)?

A. No. The *2017 VA/DoD Clinical Practice Guideline for the Management of Posttraumatic Stress Disorder and Acute Stress Disorder* does not include biofeedback as a treatment for PTSD.

The MHS relies on the VA/DoD clinical practice guidelines (CPGs) to inform best clinical practices. The CPGs are developed under the purview of clinical experts and are derived through a transparent and systematic approach that includes, but is not limited to, systematic reviews of the literature on a given topic and development of recommendations using a graded system that takes into account the overall quality of the evidence and the magnitude of the net benefit of the recommendation. A further description of this process and CPGs on specific topics can be found on the VA clinical practice guidelines website.

Q. Do other authoritative reviews recommend biofeedback as a treatment for PTSD?

A. No. Other authoritative reviews have not substantiated the use of biofeedback for PTSD.

Several other recognized organizations conduct systematic reviews and evidence syntheses on psychological health topics using similar grading systems as the VA/DoD CPGs. These include the Agency for Healthcare Research and Quality (AHRQ) and Cochrane.

- AHRQ: A 2018 comparative effectiveness review of psychological and pharmacological treatments for adults with PTSD included a single study comparing neurofeedback to a wait-list comparison group (Forman-Hoffman et al., 2018). In this study (van der Kolk et al., 2016), the neurofeedback group had

significantly greater decreases in PTSD as measured by the Clinician Administered PTSD Scale at post-treatment and one-month follow-up, but the strength of evidence was rated as insufficient.

- Cochrane: No reviews were found on biofeedback as treatment for PTSD.

Q. Is there any recent research on biofeedback as a treatment for PTSD?

A. A January 2021 literature search identified two recent, high quality systematic reviews of neurofeedback for PTSD (Bisson, van Gelderen, Roberts, & Lewis, 2020; Steingrimsson et al., 2020). A systematic review of EEG neurofeedback for PTSD included four small randomized controlled trials (RCTs) with a total of 123 participants (Steingrimsson et al., 2020). None of the included trials compared EEG neurofeedback to sham, instead using either a wait-list or treatment as usual comparison group. Three of the studies were included in a meta-analysis, with a significant standardized mean difference post-treatment for self-reported PTSD symptoms in favor of EEG neurofeedback, but there was very high heterogeneity and the certainty of evidence was graded as very low.

A systematic review and meta-analysis of non-pharmacological and non-psychological approaches to the treatment of PTSD included two RCTs of neurofeedback with a total of 74 participants, concluding that there was emerging evidence for the use of neurofeedback for PTSD based on some evidence of efficacy from a meta-analysis of the two trials, with a very low certainty of evidence (Bisson et al., 2020).

Q. What conclusions can be drawn about the use of biofeedback as a treatment for PTSD in the MHS?

A. Based on the current evidence base, biofeedback is not recommended as a treatment for PTSD in the MHS. More research is needed to establish the efficacy of biofeedback as a treatment for PTSD.

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Released March 2021 by the Psychological Health Center of Excellence
301-295-7692 | health.mil/PHCoE