

Biofeedback

What Is It?

Biofeedback uses various devices to measure physiological activities, with the intent of improving health or performance by learning to consciously control those activities. Clinical biofeedback emerged as a discipline starting in the late 1950s, as increasing numbers of technologies were developed to measure different body functions. Since that time, it has expanded dramatically.

Any number of body functions can be monitored in biofeedback. Certain biofeedback devices work best for different conditions. For example, measuring muscle tension can help with tension headaches, while neurofeedback works well for attention deficit and hyperactivity disorder (ADHD). Important examples of biofeedback devices include the following:

- Hand temperature (thermal biofeedback therapy)
- Skin conductance (electrodermal response)
- Respiratory rate and chest wall expansion
- Cardiovascular measurements, including heart rate (pulse) and heart rate variability (HRV), which are the beat-to-beat differences noted on a heart monitor
- Electroencephalography (EEG). EEG biofeedback is typically referred to as neurofeedback.
- Muscle tension (electromyography)
- Number of steps, measured on a pedometer or other wearable device
- Body weight (even your scale is a biofeedback device of sorts)

A variety of qualified professionals can offer biofeedback, ranging from psychologists and physicians to dentists, nurses, social workers, occupational therapists, physical therapists, and social workers.

How It Works

Seeing how these measurements change in real time in response to different emotions, thoughts, or behaviors empowers a person to mentally control physical functions they may not have previously been aware they could control. The end goal is to learn how to change body functions to improve health and/or performance, in a way where ideally the changes will endure without continued use of an instrument.

In a clinical setting, a practitioner might combine biofeedback with other treatments, such as Cognitive Behavioral Therapy (CBT) or relaxation techniques. Biofeedback can provide one element of a multifaceted intervention, enhancing the efficacy of other treatments by drawing a person's awareness to their own ability to consciously change their body functions.

How to Use It

Biofeedback is often offered by various mental health providers, particularly psychologists who have done additional certification. There are various products a person can use on their own to

do biofeedback as well, but it is best to have support from a trained professional, especially early on.

When to Use It

Consider biofeedback for people who tend to be more technology-minded or like to see concrete data related to how their mental efforts affect them physically.

Recent studies have been especially favorable regarding the potential for biofeedback to treat various types of chronic pain¹ and swallowing function.² HRV can be useful for enhancing sports performance¹ and improving pulmonary function during asthma attacks.³ A recent, large-scale review and meta-analysis found no benefit for biofeedback for stress urinary incontinence in women.⁴ A 2018 study found benefit of muscle tension biofeedback for stroke rehabilitation.⁵ More studies are needed, but biofeedback shows potential benefit for treating OCD as well.⁴ Neurofeedback was found to benefit people with uncontrolled seizures.⁶ Biofeedback helps with various types of headaches and has been given a “Grade A” evidence rating by various national organizations.⁷ A recent systematic review found support for visual biofeedback for balance in elderly populations.⁸ A 2019 Cochrane review concluded more irritable bowel syndrome (IBS) studies were needed to draw conclusions⁹, but a study indicates that home biofeedback helps with dyssynergic defecation.¹⁰ Electrodermal feedback shows promise with reducing pain and chronic inflammation.¹¹

A 2017 meta-analysis found benefit for HRV training for stress and anxiety.¹² One study found benefit for chronic back pain,¹ another found it may help with reducing cravings in substance use disorders,¹³ and still another found it reduced risk of admissions, emergency room visits, and depression in people with coronary artery disease.¹⁴ Phone-based HRV interventions can improve cardiovagal function.¹⁵

Biofeedback Research: A Summary

A rating system for efficacy for biofeedback is used by national and international groups. Some of their ratings, as featured on the website of the [Association for Applied Psychophysiology and Biofeedback](#), are listed below.^{16,17}

Level 5: Efficacious and Specific

- Constipation and fecal incontinence in females
- Fecal elimination disorders in females
- Urinary incontinence in females

Level 4: Efficacious

- Anxiety
- Attention deficit disorder and attention deficit and hyperactivity disorder
- Constipation and fecal incontinence in males
- Fecal elimination disorders in males
- Headache in adults
- Hypertension
- Jaw area pain
- Temporomandibular disorders
- Urinary incontinence in males

Level 3: Probably efficacious

- Alcoholism/substance abuse
- Arthritis
- Asthma and other breathing problems
- Chest pain (non-cardiac)
- Chronic pain
- Epilepsy
- Hyperventilation
- Insomnia
- Low back pain
- Pediatric migraines
- Phantom limb pain
- Posture-related pain
- Stump pain

Level 2: Possibly efficacious

- Cancer and HIV, effect on immune function
- Cerebral palsy
- Chronic obstructive pulmonary disease
- Depressive disorders
- Diabetes mellitus
- Fibromyalgia
- Foot ulcers
- Hand dystonia
- Irritable bowel syndrome
- Knee pain
- Kneecap subluxation
- Mechanical ventilation
- Motion sickness
- Myocardial infarction
- PTSD
- Raynaud's
- Repetitive strain injury
- Stroke
- Traumatic brain injury
- Tinnitus
- Urinary incontinence in children
- Vulvar vestibulitis

Level 1: Not empirically supported

- Autism
- Eating disorders
- Multiple sclerosis
- Spinal cord injury

The ratings of efficacy presented are compiled from The Association for Applied Psychophysiology and Biofeedback's list of disorders and treatments as well as Yucha and Gilbert's 2004 book on biofeedback and neurofeedback.

Biofeedback can enhance the effectiveness of other treatments by helping individuals become more aware of their own role in influencing health and disease; it can be quite empowering to patients.

What to Watch Out for (Harms)

Biofeedback is very safe, provided that instrumentation is operated correctly, and practitioners are able to set reasonable and safe parameters and goals for a person to aim for in terms of various physiological measures.

Tips From Your Integrative Health Colleagues

Most experts would agree that it is best to obtain biofeedback from a qualified health care professional. Get to know practitioners at your site and in your local community. To find biofeedback professionals who practice in a certain part of the country, use the following as resources:

- [Association for Applied Psychophysiology and Biofeedback](#)
- [Biofeedback Certification International Alliance](#). The BCIA was established to provide certification for biofeedback providers worldwide.
- [International Society for Neuroregulation & Research \(ISNR\)](#). Organization built around neurofeedback.

Resources

Websites

- [Association for Applied Psychophysiology and Biofeedback](#). <https://www.aapb.org/i4a/pages/index.cfm?pageid=1>
- [Biofeedback Certification International Alliance](#). <https://www.bcia.org/i4a/pages/index.cfm?pageid=1>
- [International Society for Neuroregulation & Research \(ISNR\)](#). <https://isnr.org/>

Books

- Evidence-Based Practice in Biofeedback and Neurofeedback (3rd ed), Gabriel Tan (2017)

Apps and Monitoring Software

- Elite HRV

Author(s)

This handout was adapted for the University of Wisconsin Integrative Health Program from the original written for the Veterans Health Administration (VHA) by Shilagh Mirgain, PhD and Janice Singles, PsyD. (2014, updated 2016)

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