Biofeedback
An interactive and innovative treatment modality.

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biofeedback:
- The technique of making unconscious or involuntary bodily processes perceptible to the senses in order to manipulate them by conscious mental control.
- A learning model focused on self-regulation.
- A non-pharmacological training technique in which people are taught to improve their health and performance by using signals from their own bodies.

goals of intervention:
- Increasing perceptual awareness and accuracy.
- Regulating and balancing the autonomic nervous system (ANS).
- Developing increased awareness of processes that are outside conscious awareness and/or under less voluntary control.
relaxation: an afterthought...

- Individuals can learn to "relax" without feedback
  - Deep breathing
  - Progressive muscle relaxation
  - Guided imagery

- Biofeedback always includes a patient, a therapist, and monitoring equipment.

equipment:

- Breathing
  - Hyperventilation, anxiety, asthma
- Brain wave
  - Alcohol/drug use, insomnia, brain damage
- Electrodermal
  - Stress response, SNS arousal
- Electromyography
  - Tension headache, muscle pain
- Finger pulse (blood flow)
  - Hypertension, anxiety
- Skin temperature
  - Migraines, Raynaud's Disease

types of feedback:
common misconceptions:
- Biofeedback works like magic and only takes one session!
- Biofeedback will "fix" symptoms and take away pain.
- When I'm hooked up to the computer, it changes how my body works.
- If I do something wrong, the machine may zap me!

the most studied, empirically supported groups:
- Migraine
- Temperature
- Tension headache
- EMG
- Abdominal pain / IBS
- Heart rate variability
- Essential hypertension
- Temperature, HRV
- Cardiac arrhythmias
- HRV

clinical efficacy guidelines:
- Reported the efficacy of psychophysiological interventions
- Rated efficacy on a 1-5 scale, with 5 representing those treatments with statistically significant "superior" results across 2 or more studies.
level 3 efficacy:

- Multiple observational studies, clinical studies, wait list controlled studies, and within subject and intrasubject replication studies that demonstrate efficacy.

level 3: probably efficacious

- Insomnia
- Alcohol/substance abuse
- Arthritis
- Chronic pain
- Recurrent abdominal pain
- Elimination disorders
- Epilepsy
- Pediatric migraine
- Traumatic brain injury

level 4 efficacy:

- In a comparison with a no-treatment control group, alternative treatment group, or sham (placebo) control utilizing randomized assignment, the investigational treatment is shown to be statistically significantly superior to the control condition or the investigational treatment is equivalent to a treatment of established efficacy in a study with sufficient power to detect moderate differences, and
- The studies have been conducted with a population treated for a specific problem, for whom inclusion criteria are delineated in a reliable, operationally defined manner, and
- The study used valid and clearly specified outcome measures related to the problem being treated, and
- The data are subjected to appropriate data analysis, and
- The diagnostic and treatment variables and procedures are clearly defined in a manner that permits replication of the study by independent researchers, and
- The superiority or equivalence of the investigational treatment has been shown in at least two independent research settings.
**level 4: efficacious**

- Adult headache
- Hypertension
- Temporomandibular disorders (TMD)
- Urinary incontinence: males
- Anxiety
- ADHD

**level 5 efficacy:**

- The investigational treatment has been shown to be statistically superior to credible sham therapy, pill, or alternative bona fide treatment in at least two independent research settings.

**Level 5: efficacious and specific**

- Urinary incontinence: women
  - Biofeedback is widely cited as superior to control group, better than or equal to other behavioral treatments (e.g., pelvic floor exercises), and better than medication in females across the lifespan.
a learning model:

Learning is interactive... guided by instruction and information to develop a skill.

creating learned behaviors:
- **heighten awareness of physiological differences and changes**
  - What does it feel like to breathe 10x per minute versus 20x per minute?
  - What words would you use to describe the sensation you feel?
- **learn to control the perceptible changes**
  - first by using the external signal (visual or auditory feedback)
  - next by using internal cues / sensations
- **skill generalization**
  - No longer need to receive feedback / no machines

an overview of the basics:
- Breathing is the foundation of all types of biofeedback training
- All patients begin by completing a stress protocol to obtain pre-intervention, "baseline" data
- Patients first achieve mastery of respiration regulation, then move on to heart rate variability regulation
- EMG training follows, if indicated based on skill-level and/or diagnostic group
- Effective skill generalization is the primary indicator for treatment termination
**intervention one:** **Joe**
- 10-year-old male with chronic abdominal pain
- Significant psychological and medical factors influencing pain
- 26 breaths per minute

**pre-intervention stress test:**

**intervention seven:**
- Resolution of pain complaints
- 9 breaths per minute
post-intervention LST:

intervention one: **Aaron**
- 14-year-old male with migraine headache
- 13 breaths per minute

pre-intervention stress test:
Intervention 4:
- 6 breaths per minute

Smoothness / rhythmicity via pauses

Coherence training: Resp/HR
simulation of pain/distress
poor coherence

“in-sync”
strong coherence

Post-intervention LST:
75%-100% coherence
progress at termination:

10-year old male

14-year old male

Each with notably improved management of symptoms associated with pain and stress.

anecdotal observations:
the clinic’s first 5 months:

- Patients report heightened sense of control over their symptoms and decreased impairment, regardless of perceived changes in pain.
- Patients report notably increased “relaxation” and awareness of physiological changes.
- By their final session, none of the patients have been able to comfortably recreate their week 1 pace of breathing.
- All would recommend biofeedback to another child/adolescent who shared their symptoms.
- All teenagers independently reported that it was “cool” or “interesting” to learn something that few people know about.
- You can achieve positive results with migraine patients even when you can’t rely on temperature-based biofeedback.
- All would recommend biofeedback to someone else with pain.

appropriate referrals:

- Appropriateness for treatment is based upon:
  - Diagnostic group / comorbidities
  - Capacity for self-regulation
  - Processing information
  - Learning
  - Adjusting
  - Practicing
  - Motivation / commitment to treatment protocol
inappropriate referrals:
- Cognitive limitations
- Impaired learning
- Slowed processing speed
- Inability to regulate or self-correct
- History of abuse
  - Lowering of defenses
- History or current experience of psychosis
  - Difficulty differentiating realities

incorporating biofeedback into your multidisciplinary treatment approach:

BARRIERS
- Cost of training and equipment
- Billing / Financial reimbursement
- Availability of resources
  - Quiet office space
  - "Non-medical" environment
- Referrals (internal vs. external)

PERKS
- Provides an additional non-pharmacological modality
- Targets management of stress and/or anxious responding (even when they don't believe they are stressed or anxious)
- Promotes active coping and self-management
- May increase internal locus of control
- Provides a life-long skill set
references:


