




Self-Regulation Interventions for Pediatric Patients:

Biofeedback & Clinical Self-Hypnosis


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SELF-REGULATION INTERVENTIONS



Mind body strategies




Modulate thinking, emotion, behavior, stress response, and somatic symptoms.



Shift attention, control or maintain what we're focused on, and self-monitor

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I have no financial interests or relationships to disclose.

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SELF-REGULATION INTERVENTIONS BIOFEEDBACK

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OBJECTIVES

AT THE CONCLUSION OF THIS PRESENTATION, PARTICIPANTS SHOULD BE ABLE TO

- Formulate a patient and family friendly introduction to self-regulation strategies, incorporating accessible resources.
- Identify conditions where biofeedback may be a beneficial addition to treatment and select an appropriate biofeedback modality.
- Combine clinical hypnosis induction techniques with post-hypnotic suggestions for common pediatric presentations.

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WHAT IS BIOFEEDBACK?

Biofeedback is the use of an external monitoring device to provide an individual with information regarding their physiological state. When used to help a person obtain voluntary control over autonomic body functions, such as heart rate or blood pressure, the technique is called biofeedback training. (American Psychological Association)

Biofeedback therapy provides visual, auditory or other evidence of the status of certain body functions so that a person can exert voluntary control over the functions, and thereby alleviate an abnormal bodily condition. Biofeedback therapy often uses electrical devices to transform bodily signals [...] into a tone or light. (Center for Medicare and Medicaid Services)

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WHAT IS BIOFEEDBACK? AGAIN, BUT THIS TIME FOR KIDS AND FAMILIES.

Biofeedback therapy teaches you how to listen to signals in your body to decrease [pain and stress]. This therapy is fun and involves computer games. Nothing will break the skin or enter the body. After therapy, you will feel more in control of your [pain, stress, body].

Biofeedback therapy teaches you to have more control over your body and decreases (stress, pain and anxiety). During biofeedback treatments, sensors are placed on your body, [like ...]. During the session, you will see your heart rate on the computer screen and play games to learn how to relax your body and mind.

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ALIVE HRV BIOFEEDBACK

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EVERYDAY BIOFEEDBACK

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WHAT DO WE MEASURE?

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CLINICAL EQUIPMENT

- Clinic Use**
 - emWave2 by HeartMath
 - NeXus-10 by MindMedia
 - Alive by Somatic Vision
 - Wild Divine (set up for combined clinic and home use)
- Home Use**
 - Mightier

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COMMON BIOFEEDBACK MODALITIES

- Breathing**
 - Measure respiration amplitude and the breathing frequency (breaths per minute).
 - Use a respiration belt, or resistive respiration belt, with stretch sensors that monitor movement.
- Heart rate variability (HRV)**
 - Measure naturally occurring beat to beat variation. HRV allows the cardiovascular system to adjust rapidly to sudden physical and psychological challenges to homeostasis.
 - Use a blood volume pulse (BVP) sensor on earlobe or fingertip.
- Temperature**
 - Measures peripheral skin temperature.
 - Use temperature sensor or thermistor.


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COMMON BIOFEEDBACK MODALITIES

- Electromyography (EMG)**
 - Measure skeletal muscle tension.
 - Use surface EMG electrodes place on specific muscle groups.
- Galvanic skin response (GSR) or skin conductance (SCL)**
 - Measures the low current circuit created between electrodes due to the perspiration on the skin.
 - Use specific GSR electrodes often on palm of hand or fingers.
- Electroencephalography (EEG) neurofeedback**
 - Measures brain waves (e.g., alpha, beta, alpha/theta, delta, gamma, and theta waves).
 - Use EEG electrodes place on the scalp.

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CLINICAL TARGETS



2020 systematic review and meta-analysis of biofeedback in pediatric populations

- 23 studies included in review
 - Pediatric conditions - headache, cystic fibrosis, cerebral palsy, arthritis, neurocognitive concerns post brain tumor, asthma, sickle cell disease
 - Exploring effect of biofeedback on breathing (forced vital capacity, forced expiratory volume), pain ratings, asthma severity, quality of life
- Modalities – EMG, thermal, respiration, HRV, galvanic skin response, EEG
- Overall effect of pediatric biofeedback is significant
 - d = 0.85 (large effect size)**
- All participants across all studies experienced null or positive effects.

Darling, K. E., Benore, E. R., & Webster, E. E. (2020). Biofeedback in pediatric populations: a systematic review and meta-analysis of treatment outcomes. *Translational Behavioral Medicine, 10*(6), 1436-1449.

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| Issue | Biofeedback Modality | Strategy |
|--|---------------------------------------|---|
| General stress, anxiety | HRV, breathing, EMG, temperature, GSR | Diaphragmatic breathing or preferred relaxation strategy |
| Muscle tension, (e.g., TMJ, tension type headaches, low back pain) | EMG | Body scan, progressive muscle relaxation (active or passive), diaphragmatic breathing |
| Headaches and migraines | Temperature, HRV, breathing | Imagery, diaphragmatic breathing |
| Chronic pain | HRV, breathing, EMG, temperature, GSR | Diaphragmatic breathing, progressive muscle relaxation, imagery |
| Raynaud's phenomenon | Temperature | Heat focused imagery |
| Sleep – worries | HRV, breathing, temperature | Diaphragmatic breathing, imagery |
| Sleep – tension, physical discomfort | EMG, temperature, GSR | Body scan, progressive muscle relaxation, diaphragmatic breathing |
| Asthma, breathing concerns | Breathing, HRV | Diaphragmatic breathing |
| ADHD, inattention | Neurofeedback (EEG) | Mindfulness, relaxation |

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CLINICAL TARGETS



2023 systematic review and meta-analysis of biofeedback on anxiety in children

- 9 studies included in review
- Modalities – HRV, EEG, EMG
- Overall effect of biofeedback on anxiety is significant
 - g = -0.699 (moderate to large effect size)**
- Biofeedback remained an effective intervention with a range of comorbidities.

Umag, E. H., & Semerci, R. (2023). Effect of biofeedback-based interventions on the psychological outcomes of pediatric populations: a systematic review and meta-analysis. *Applied Psychophysiology and Biofeedback, 48*(3), 299-310.

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NOTES & CONTRAINDICATIONS

- *Obtain proper training.
- *Treat conditions that you are trained to treat.
- *Chose a modality that matches your patients needs and their physical body.

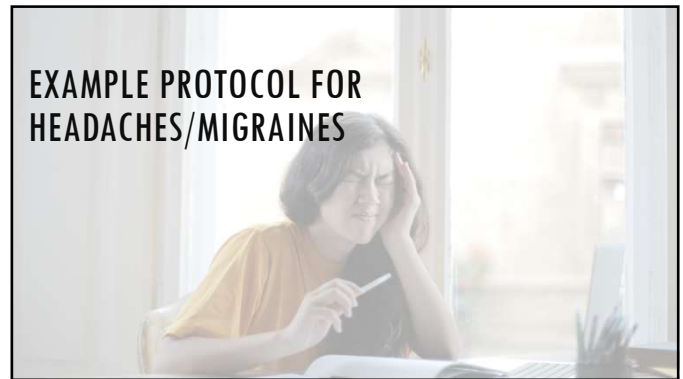
Contraindications

- Avoid HRV biofeedback in patients with heart conditions, especially if they have a pacemaker.
- Not been tested in patients with severe mental illness and personality disorders (schizophrenia, psychosis, dissociative identity disorder).

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BRIEF BIOFEEDBACK PROTOCOL FOR GENERAL MH REFERRALS

Retrospective chart review of clinical program

- Patients, age 10-18, were referred to biofeedback program
- Measured respiration rate and HRV with biofeedback.
- Obtained report of somatic symptoms and satisfaction with biofeedback.

Intervention

- Session 1: Psychoeducation on stress response. Complete a biofeedback stress profile.
- Session 2: Review stress profile data. Teach diaphragmatic breathing with a pacer.
- Session 3: Introduce HRV and continue using diaphragmatic breathing.
- Session 4: Continue breathing and HRV. Increase challenge level.
- Session 5: Optional booster session, review and continued practice.

Allioto, A., David, J. G., & Gramszlo, C. (2023). Feasibility of a brief biofeedback protocol to train self-

MENTAL HEALTH

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SINGLE SESSION BIOFEEDBACK PROTOCOL FOR HEADACHES

Pilot study

- 20 pediatric patients (10 girls, 10 boys), mean age 11.6 yrs (SD 2.2)
- 56% met criteria for diagnosis of migraine headaches
- Patients scheduled for biofeedback appointment.
- Measured patient's ability to increase peripheral body temperature

Intervention

- 1 hour single session biofeedback assisted relaxation training
- Taught deep breathing, progressive muscle relaxation, and guided imagery.
- Given an individualized audiotape which was recorded during appointment.
- Encouraged to practice with the tape 3x/week and at headache onset.

Powers, S. W., Mitchell, M. J., Byars, K. C., Benti, A. L., LeCates, S. L., & Hershey, A. D. (2001). A pilot study of one-session biofeedback training in pediatric headache. Neurology, 56(1), 133-133.

CHRONIC ILLNESS

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BRIEF BIOFEEDBACK PROTOCOL FOR GENERAL MH REFERRALS

Outcomes
Breathing, HRV, and Somatic Symptoms

- Statistically significant reduction in somatic symptoms
- Significantly slower respiration rate.
- Improvement in HRV

Feasibility and Satisfaction

- 79 referrals over 2 yrs. 58 came to at least one session. Recruitment rate of 73%.
- 39 completed the program. Drop out rate of 33%.
- Strong satisfaction ratings. Parents and child reported it helped them deal with presenting issue and that they'd recommend the program to other families.

Nemours Children's Hospital has been using this protocol since at least 2019 and continues to offer this brief biofeedback protocol to their patients.

MENTAL HEALTH

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SINGLE SESSION BIOFEEDBACK PROTOCOL FOR HEADACHES

Outcomes
Peripheral Body Temperature

- Significant improvement in ability to increase peripheral body temperature
- Positive changes maintained from training to follow up visit.
- 90% obtained a positive change after training. 95% showed positive change at the follow up.


Pain

- 85% of parents reported child was functioning "better" at follow up visit.
- Headache frequency decreased from 12.9 to 9.7 days/month
- Headache duration decreased from 6.9 hours to 5.2 hours
- Pain severity decreased from 5.0 (0-10 scale, 10 = most pain) to 4.5

CHRONIC ILLNESS

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- Biofeedback helps patients learn how to listen to their body and gain control over how they're feeling. It's non-invasive and involves technology and computer games.
- Modalities include breathing, heart rate variability, temperature, EMG, galvanic skin response, and EEG.
- It can be helpful within treatment for anxiety and a wide range of pediatric conditions.



BIOFEEDBACK SUMMARY

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WHAT IS HYPNOSIS? AGAIN, BUT THIS TIME FOR KIDS AND FAMILIES.

Hypnosis is a brain-power exercise. The clinician is the imagination coach.

Hypnosis helps us focus our attention and imagination on purpose, ("pay attention on purpose") to help us XXX (feel calm, turn down our pain, etc.)

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**SELF-REGULATION INTERVENTIONS
CLINICAL SELF-HYPNOSIS**

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EVERYDAY TRANCE



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WHAT IS CLINICAL SELF-HYPNOSIS?

A spontaneously occurring or induced alternative state of awareness (with or without relaxation) in which an individual develops a focused concentration on some idea or image with the expressed purpose of maximizing potential, creating a change, and/or reducing or resolving some problem (Kohen and Olness, 2011)

A state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion. (APA Division 30)

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HYPNOSIS MYTHS

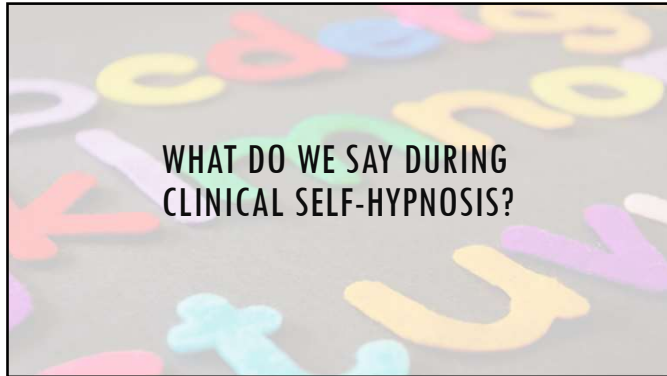
Myth: The person being hypnotized will be under control of the clinician and can be made to do or say anything.
Fact: The patient is in control the entire time.

Myth: Hypnosis is something done to people.
Fact: It's a skill or technique that people learn to do for yourself.

Myth: People have to be "hypnotizable," "suggestible," or "gullible" for hypnosis to work.
Fact: Research indicates the majority of people can benefit from hypnosis if they are willing to learn the skill.

Myth: During hypnosis, people are unconscious.
Fact: Although often feeling very relaxed, patients are still active participants in the process.

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STAGES OF CLINICAL SELF-HYPNOSIS

- Induction**
 - Breathing, guided muscle relaxation, imagery of a staircase
 - Magnetic fingers, "okay" finger position, gentle hug, slow tapping
- Intensification or deepening**
 - With every breath you take, your relaxation increases / you become more comfortable.
 - Ego strengthening – You are doing this just right. Your mind knows exactly what to do.
- Therapeutic suggestions**
 - You can tie that worry to one of those beautiful balloons. Notice how great it can feel to watch that balloon float away.
 - Notice how easily and naturally your breath finds the right pace for you, helping you become comfortable and ready for sleep.
 - It can be exciting to discover how different your pain feels when you turn that control dial down.

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CLINICAL TARGETS



- Habit problems
 - Thumb-sucking, nail-biting, Hair-pulling, Nocturnal Enuresis, Habit Cough
 - Enuresis. (Motaharifard & Mohkam, 2022)
 - Mixed research findings. 1 study found it was more helpful than imipramine. Another study found bell and pad bedwetting alarm were superior to hypnosis.
- Mental health conditions
 - Anxiety, depression, grief, anger, adjustment, PTSD
- Coping and adjustment to chronic illness

Full list of research supporting these clinical targets – Kohen, D. P., & Kaiser, P. (2014). Clinical hypnosis with children and adolescents—What? Why? How?: *Clinical applications and efficacy. Children, 11(3)* 74-98


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STAGES OF CLINICAL HYPNOSIS

- Post-hypnotic suggestions**
 - When you notice the worries pop up, your imagination will know to send them away on a balloon.
 - Your body will remember how to feel this relaxed. Whenever you need it, you will be able to release the tension in your muscles.
 - You'll be able to picture your control panel at any time, turning down your pain as you need to.
 - When you lay in bed, your brain and body will remember how to become comfortable and sleepy.
- Termination and resumption of awareness**
 - When you're ready, you can bring your attention back to our room.
 - In your own time and way, you will come back to our session.
 - When your eyes are ready, they will open.

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CLINICAL TARGETS



- Headaches – Kohen & Zajak 2007 and follow up Kohen, 2010
 - Retrospective chart review of 144 patients taught clinical self-hypnosis for headaches
 - Decreased frequency of headache (M 4.5/wk to 1.4/wk). Reduction in intensity (M 10.3 to 4.7). Reduction in duration (M 23.6 hrs to 3.0 hrs)
 - Follow up 85% reported continued relief with self-hypnosis, 44% reported decreased headache frequency, 31% noted decreased severity, and 56% reported reduced intensity.
- Procedural pain and distress – scoping review 2023
 - Moderate to large effect sizes.
 - Evidence of superiority to control conditions and nonpharmacological interventions (e.g., distraction, acupuncture)
- Chronic pain – Cochrane meta-review 2010
 - Hypnosis was included in meta-review of psychological self-regulation strategies for chronic pain with positive effects on pain reduction.

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CLINICAL TARGETS



- Sleep concerns, insomnia – Anbar & Slothower, 2006
 - Retrospective chart review of pediatric patients (age 7-17) with insomnia
 - 68% patients did 1 or 2 sessions of hypnosis
 - 90% Reported improvement in sleep onset, 52% resolution of night wakings, and 38% reported improvement in night wakings
- Nausea and vomiting
 - Used in patients with nausea and vomiting related to chemotherapy (Loder, Burch, & Rizzoli, 2012)
 - Biweekly sessions for 3 months decreased symptoms of nausea in patients with DGBI more than standard medical care. (Sun-Edelstein & Mauskop, 2009)
- Abdominal pain –RCT of hypnosis for FAP and IBS (Vlieger, 2007)
 - Hypnotherapy consisted of 6 sessions over a 3-month period. Patients in the SMT group received standard medical care and 6 sessions of supportive therapy
 - Hypnotherapy was highly superior, with a significantly greater reduction in pain scores (intensity and frequency) at 1 yr.

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The Magic Glove

Using imagination and self hypnosis to help kids with pain

WATCH ON YOUTUBE



- Magic Glove can create significant sensory changes and partial anesthesia, reducing anxiety and pain with needle pokes and procedures.
- Children 3 to 12 years old, adjust to the developmental age of the child
- Used for blood draws, IV starts, needle pokes, sutures, port access, etc.
- Use on hands, arms, feet, legs, or any area as a "blanket"

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NOTES & CONTRAINDICATIONS

- *Hypnosis should not be utilized for entertainment
- *Obtain proper training.
- *Stay within your scope of practice.
- *Hypnosis should not be used to treat a condition for which there is a fundamentally appropriate, acceptable, accessible, and effective treatment. E.g., strep throat.
- *Tailor hypnosis to the developmental level and capacity of the patient.

Contraindications

- Do not use hypnosis with patients experiencing severe mental illness such as schizophrenia.
- Do not use if the patient is actively intoxicated or under the influence of substances.
- Generally not recommended for patients with personality disorders.

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MAGIC GLOVE

STEPS FOR MAGIC GLOVE

1. Use a combination of focused imagination, verbal suggestions, and physical touch to create a protective layer over the area.
 - a) Repeatedly run your hand over the area as you provide verbal suggestions.
 - b) Draw the child into the process, having them describe the glove to you.
2. Test the sensory changes, comparing hands.
3. Complete the needle poke / procedure when the patient indicates clear sensory changes.
4. Take off the glove after the procedure, with post-hypnotic suggestions about how they can use the magic glove whenever they need it.

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CLINICAL SELF-HYPNOSIS FOR DISORDERS OF THE GUT-BRAIN INTERACTION

- Comparative effectiveness trial (Vlieger et al., 2012 and Rutten et al., 2017)
 - Compared clinician guided hypnosis sessions (6 sessions over 3 months) to a group who completed home-based hypnosis using an audio recording
 - General relaxation instructions were used.
 - At end of treatment (3 months), 50.1% of clinician led group reported treatment success, while 36.8% in the home group reported treatment success.
 - At 1 year follow up, 71% of the clinician led group reported treatment success, while 62.1% of the home group – *not significantly different*.

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CLINICAL SELF-HYPNOSIS FOR DISORDERS OF THE GUT-BRAIN INTERACTION

“Notice the color of the sensation in your stomach. I wonder if you can change the color to a color of comfort. Perhaps swirling the colors, gently painting brush strokes with a paintbrush, or cool pressure from spray paint. You are able to change the color in a way that works for you. The new color of comfort is surrounding your belly. It coating it and protecting it. You might notice ways the new color is helping you feel differently. Whenever you need to, you will be able to change the color of your stomach’s feeling to bring comfort.”

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BIOFEEDBACK TRAINING

- Association for Applied Psychophysiology and Biofeedback
- Midwest Society for Behavioral Medicine and Biofeedback
- Biofeedback Certification International Alliance (BCIA)
- International Society for Neurofeedback and Research

CERTIFICATION

BCIA-approved health care fields include psychology, medicine, nursing (including two-year registered nurses with license, not LVNs or LPNs), physical therapy, occupational therapy, social work, counseling, marriage family therapy, rehabilitation, chiropractic, recreational therapy, physician’s assistant (with certification or license), exercise physiology, speech pathology, and sports medicine. The following fields require a master’s degree: music therapy and counseling education (MEd in counseling). Appropriately credentialed Doctor of Medicine and Dentistry are also accepted.

- Anatomy & physiology course
- 42 hour biofeedback didactic education
- 20 hour practical biofeedback training
- Certification exam

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- Clinical self-hypnosis teaches patients to “pay attention on purpose” to achieve their goal.
- It can be helpful with a wide range of presenting concerns and a wide age range.
- Clinical self-hypnosis sessions include induction, intensification or deepening, therapeutic suggestion, post-hypnotic suggestion, and termination/return to awareness.



CLINICAL SELF-HYPNOSIS SUMMARY

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BIOFEEDBACK RESOURCES & HANDOUTS

- A Practitioner’s Guide — Biofeedback, Fourth Edition: A Practitioner’s Guide edited by Mark S. Schwartz and Frank Andrasik
- The Clinical Handbook of Biofeedback: A Step-by-Step Guide for Training and Practice with Mindfulness 1st Edition by Inna Z. Khazan
- Biofeedback and Mindfulness in Everyday Life: Practical Solutions for Improving Your Health and Performance by Inna Khazan

Children’s Minnesota – Ways to Wellness handout

<https://www.childrensmn.org/downloads/2015/12/careservices.integrativemedicine.biofeedback.pdf>

GI Kids – Biofeedback

<https://gikids.org/tests-procedures/biofeedback-training/>

American Migraine Foundation – description of biofeedback for patients

<https://americanmigrainefoundation.org/resource-library/biofeedback-and-relaxation-training/>

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CLINICAL SELF-HYPNOSIS TRAINING

- American Society of Clinical Hypnosis (ASCH)
- National Pediatric Hypnosis Training Institute (NPHTI)
- American Psychological Association, Division 30, Society of Psychological Hypnosis
- The International Society of Hypnosis
- Milton H. Erickson Foundation
- American Society of Clinical Hypnosis
- The International Society of Hypnosis
- Minnesota Society of Clinical Hypnosis

CERTIFICATION
To obtain Certification of Clinical Hypnosis through ASCH, you must hold at least a masters degree in a health care discipline considered appropriate by the Society and have licensure/certification in the state/province in which they practice, membership in a professional society consistent with a degree, and Licensure or Certification by the state or province in which you practice to practice independently.

- Complete Level 1 and Level 2 ASCH approved Clinical Workshop training;
- Minimum of 20 hours of individualized training/consultation with an ASCH Approved Consultant;
- Minimum of two years of independent practice utilizing clinical hypnosis (2 years from the completion of the basic course).

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QUESTIONS

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CLINICAL SELF-HYPNOSIS RESOURCES AND HANDOUTS

- Hypnosis with Children 5th Edition by Daniel P. Kohen, and Karen Olness
- Therapeutic Hypnosis with Children and Adolescents, Second Edition Hardcover by Laurence Sugarman, William Wester II, William Wester
- Harry, the Hypno-potamus: Metaphorical Tales for the Treatment of Children by Linda Thomson
- Harry the Hypno-potamus: More Metaphorical Tales for Children by Linda Thomson

Meg Foundation – Magic Glove
<https://www.megfoundationforpain.org/2022/07/22/the-magic-glove-hypnotic-pain-management-for-children/>

GI Kids – Clinical Hypnosis handout
<https://gikids.org/digestive-topics/clinical-hypnosis/>

Biobehavioral Strategies for Pediatric Pain (Mayday Foundation & Lurie Children's)
<https://www.luriechildrens.org/globalassets/media/pages-for-healthcare-professionals/prn-childrens-care-10-16-2022-2022-pediatric-neurobehavioral-approach.pdf>

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- Mind-body strategies that can be incorporated into treatment or used as a stand-alone approach.
- Patients are taught these strategies then use them independently to manage their symptoms.
- Biofeedback can be used to treat a wide range of presenting concerns in pediatric patients to increase awareness and control over their body.
- Clinical self-hypnosis is a useful approach that helps patients focus their attention to achieve their goal.



SELF-REGULATION SUMMARY

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ALIVE HRV BIOFEEDBACK

DUAL DRIVE

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ALIVE HRV BIOFEEDBACK

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ALIVE HRV BIOFEEDBACK

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