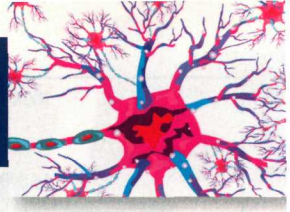

Strategies for self-regulation: Rediscovering the physiological basis of behavior

As a mental health professional with more than 35 years of education and experience, I have come to realize that I sorely underestimated the importance of the physiological basis of behavior. Yes, I had taken classes in psychophysiology, sensory perception and psychopharmacology. These classes taught me to appreciate the role of the brain in behavior, but the "real" emphasis of my training, as a clinician, was on the counseling relationship, theories of personality and therapeutic strategies for change. I was largely taught to connect to the person in front of me, encourage their depth of personal understanding, teach them new skills and help them reach the goals they wanted to achieve. Sometimes medication was warranted if the client's symptoms were so intense or chronic that they interfered with progress in counseling.

Today, after rediscovering the foundational importance of the physiological basis of behavior, I wish there had been additional physiological emphasis in my training. I can see now how this deficit limited my success with clients and their experience of recovery and change.

Four years ago, my colleagues and I embarked on a new adventure, learning about the world of neurotherapy, biofeedback, neurofeedback and neuroanatomy. Little did I know this would take me down such a complex, yet exciting, road of professional discovery and clinical change. To date I've completed more than 120 hours of continuing education on neurofeedback, biofeedback, quantitative electroencephalography, neuroanatomy and physiology. I've read more than a dozen books and an endless number of articles on these and related subjects to learn more about the vast potential of this new therapeutic world.

With my wife and closest colleague, Lori Russell-Chapin, I've had the opportunity to be part of a seminal research study on the effects of neurofeedback on the default mode network of children with attention-deficit/hyperactivity disorder (ADHD) and have published a book titled *Neurotherapy and Neurofeedback: Brain-Based Treatment for Psychological and Behavioral Problems*. Perhaps more important, I have dramatically changed my clinical practice, and my clients have made improvements that I never before thought possible. While there is so much I'd like to share with you about the importance of the physiological basis of behavior, the primary focus of this article will be on 10 strategies for improving self-regulation. Of course the value of these strategies cannot be fully understood without some background on the physiological basis of behavior.

The definition of self-regulation

The term *self-regulation* probably sounds like an obvious and minor aspect of therapy, but I have come to understand it as an essential, foundational principle of all therapeutic healing and recovery. Without it, clients will tend to revisit their particular problematic behavior across repeated treatment episodes. They will experience support, insight and even some change through their counseling, but their physiological predispositions will likely cause them, upon encountering sufficient psychosocial distress, to return to the symptomatic behaviors that originally brought them to counseling. Even those clients treated with medication are likely to experience a reoccurrence and deepening of their symptomatic behavior.

As defined in our book, self-regulation involves the ability of the body and mind to assess themselves and the situation, and then to decide what physiological and behavioral changes are needed to maintain or return to a state of optimal balance. In his book *Why Zebras Don't Get Ulcers*, Robert Sapolsky called this complex process allostasis. He explains that allostasis involves the brain's coordination of body-wide changes via the autonomic nervous system, allowing the body to move from states of threat and danger to states of healing and recovery. Of course, not everyone's autonomic nervous system operates at a level of optimal functioning. In fact, most of us have several sources of neurological dysregulation that make this task very difficult, if not downright impossible.

Sources of dysregulation

Research has shown that the brain and the autonomic nervous system can become dysregulated for many reasons. From the onset of life, we are subject to genetic predispositions from our parents and epigenetic influences from past generations. During conception, gestation and birth, factors such as maternal distress, birth trauma, oxygen deprivation and immune challenge can harm the brain's development and healthy functioning.

Later, childhood sometimes brings exposure to environmental toxins such as pesticides, heavy metals and petroleum-based products, as well as disease

processes and high fevers that can have a negative impact on both neurological and immunological functioning. As we grow, poor diet involving genetically modified foods, hormones, processed foods and carbohydrates, as well as inadequate exercise, can also affect neurological functioning and the generation of new neurons. Exposure to emotionally suppressive psychosocial environments involving poor attachment, abuse, neglect or trauma can further influence neurological functioning.

Direct brain damage due to a closed head injury, concussion or stroke also dysregulates brain functioning and can have emotional, behavioral and cognitive consequences, even after the structural damage has healed. Even prolonged exposure to stress can exhaust the sympathetic nervous system and inhibit the parasympathetic nervous system's balancing response, causing problems with neurological overactivation (anxiety), underactivation (depression) and unstable activation (bipolar disorder, panic attacks and migraines). There are also short- and long-term consequences on neurological functioning associated with medication, substance abuse and addiction. Seizure disorders and chronic pain can further disrupt healthy neurological functioning, as can repeated exposure to anesthesia.

Even the natural process of aging has been found to dysregulate brain functioning by causing decreases in alpha brain waves, which is associated with cognitive decline. Given all these sources of potential vulnerability, it is highly unlikely that the normal course of life can be lived without some degree of neurological dysregulation.

The basic physiology of dysregulation

The physiology and neuroanatomy of brain dysregulation is very complex. Specific areas of the brain and their related functions may be disturbed, as can communication within and between various neurological networks. Dysregulation can also occur at the neuronal level, which involves critical changes in chemical and electrical activity. It can also occur more globally across the entire nervous system.

Because the brain and the nerves control all of our bodily functions, including digestive, respiratory, musculature, circulatory and endocrine responses, this provides a connective mechanism to potentiate self-regulation. Perhaps even more amazing is that the human body's interactive design features the capacity for entrainment of each system with the other. This physiological interplay allows us as therapists to enter into one system and potentially affect change in many others.

Take, for example, peripheral skin temperature. When this temperature is higher, muscles are relaxed, breathing is more even, digestion is more active, hormones that allow healing and recovery are released, and the brain is more inclined to move to slower brain wave states. When peripheral skin temperature is lower, muscles are more likely to be tense and breathing more shallow and frequent. In addition, digestion is inhibited, fight-or-flight hormones are released, and faster brain wave states predominate brain activity.

Stephen Porges extended our understanding of the stress response and the classic roles of the sympathetic (fight or flight) and parasympathetic (healing

and recovery) nervous systems in his book *The Polyvagal Theory*. He suggested that a third mechanism within the vagal nerve formation, available to mammals, allows them to use the "social engagement system" to further manage the impact of stress. Such interpersonally reciprocal mechanisms as prosodic speech, head movements and eye gaze, first established in early healthy attachment, are later available to assess safety, thus allowing empathy and the establishment of meaningful interpersonal connection. Should the social engagement system fail to develop or become faulty, the nervous system would be dysregulated, and healthy emotional regulation and interpersonal interaction would be challenged.

Porges coined the term *neuroception* to describe the nervous system's continuous evaluation of risk to determine whether the environment is safe or requires a defensive response. If the environment is safe, the more primitive sympathetic nervous system's fight, flight or freeze response will be inhibited. If the environment is dangerous, the response will become activated and protect against threat or harm. An overactivated sympathetic nervous system is a significant factor in myriad psychological, behavioral and personality disorders.

Strategies for self-regulation

As therapists, we can capitalize on the physiological basis of behavior, its interactive mechanisms and its capacity for healthy self-regulation. In our neurotherapy and neurofeedback book, we detail 10 different methods of self-regulation. Some are very easy to implement immediately in your counseling practice. Others require some investment in materials, equipment and training. All of the strategies will help your clients establish healthy self-regulation.

Most therapists already use the first strategy, which involves establishing a compassionate and empathetic therapeutic relationship and encouraging clients to enhance and utilize their own interpersonal support system.

The second strategy is to focus on exercise, diet and dietary supplements. Thirty minutes of intense aerobic exercise five times a week can promote development of the brain-derived neurotropic factor (the brain's Miracle-Gro) for neuronal development. A low-carbohydrate and natural diet of fruits, vegetables and protein, generally free of hormones, processed foods, sugar and other white foods (flour, rice and potatoes) is healthiest for the brain. In addition, some dietary supplements help improve brain functioning. These include fish oil, curcumin and N-acetylcysteine, which can reduce neuronal inflammation and modulate neurotransmitter pathways. Working conjointly with physicians and dietitians is a must.

The third method involves training clients to regulate their peripheral skin temperature. This simple skill will demonstrate to clients that they can control their physiological functioning (self-regulate) by increasing their peripheral skin temperature, thus relaxing their muscles, slowing their breathing and heart rate, and calming their brain.

The fourth skill is diaphragmatic breathing, which can also easily be taught to clients. Clients are trained to increase the depth of their breaths, while simultaneously decreasing the frequency of the breaths they take per minute.

The fifth strategy is heart rate variability training, a more involved biofeedback technique that is made easy thanks to software and hardware designed by HeartMath. The technique involves the use of a plethysmograph that reads a client's blood flow and converts it into a breathing trace line. The client can observe this trace line and learn to control it, thus increasing the synchrony between his or her breathing and heart rate.

The sixth skill is mental imagery and hypnosis. By becoming aware of and learning how to change visual, auditory and kinesthetic imagery, a client can learn to alter negative images and create more positive somatic and neurological states.

The seventh skill involves the use of therapeutic harmonics that offer an auditory or acoustical intervention via specially designed and engineered CDs. The harmonics produce entrainment to specific brain wave states associated with common problems such as anxiety, depression, trauma, ADHD and sleep. In other words, the client simply listens to the selected CD, and his or her brain waves entrain or align with the embedded acoustics.

The eighth strategy uses audiovisual entrainment that is induced by predesigned programs that deliver various frequencies of sound to the auditory cortex and flashing light to the optic nerve. These also can be used to treat anxiety, depression, trauma, ADHD and sleep problems.

The ninth self-regulation strategy is transcranial direct current stimulation. This involves the use of a small battery-powered current delivered directly to a location on the scalp. This technique has been found to be especially helpful with depression, but it has also been used to treat a variety of other psychological and behavioral problems.

The last self-regulation technique is neurofeedback, which requires a much more extensive investment in training and equipment. The technique utilizes behavioral principles of reinforcement, specially designed software and real-time measurements of clients' brain waves to either increase or decrease targeted brain waves related to many psychological and behavioral disorders. Following neurofeedback training, clients are better able to use the right brain wave for the right task at the right time. Once their neurological platforms have been strengthened, clients are often much better able to put into practice the ideas and skills they have learned in counseling. Even clients with severe functional neurological damage due to head injury, stroke, anoxia, high fever, substance abuse, other disease processes or aging can recover an observable and meaningful amount of their lost functioning.

Conclusion

During the past four years of clinical practice, I have been amazed at the progress achieved by my clients. Many have reduced or eliminated their medications. Others have overcome years of discouragement connected to counseling or medical treatment that failed to help them resolve their problems sufficiently. Students have improved their grades from C's and D's to A's and B's. Individuals with years of addiction and relapse learned how to self-regulate their emotional reactions to life stress and better maintain sobriety. Clients with bipolar disorder or Asperger's made huge strides in reducing medication and becoming more

interpersonally engaged. A young man with severe childhood anoxia "woke up" from his near continuous sleep state and has a shot at a normal life. Clients with personality disorders later tested in the normal range on the Minnesota Multiphasic Personality Inventory and the Millon Clinical Multiaxial Inventory, suggesting even personality disorders have a significant physiological and neurological basis. Older persons with cognitive decline or who had experienced a stroke became more cognitively engaged and improved their speech, even four years after the stroke.

By better attending to the physiological basis of behavior and teaching clients skills of self-regulation, I have become a much better therapist, and my clients have benefited greatly. Today, effective counseling involves much more than establishing a therapeutic relationship, utilizing standard therapeutic techniques and referring for medication when symptoms seem too intense. More than ever, I am convinced that the foundation of most psychological, behavioral and cognitive problems is, indeed, physiological in nature. Although there will always be an important role for skilled therapists, counseling alone cannot effect the kind of change that occurs when attention is paid to both the physiological and cognitive aspects of behavior, especially for those with more moderate, severe and chronic conditions.

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Lori Russell-Chapin and Laura Jones serve as co-editors of the Neurocounseling: Bridging Brain and Behavior column. Contact them with comments, questions about neurocounseling or ideas for future columns at *lar@fsmail.bradley.edu* or *Laura.Jones@unco.edu*. ◆

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