

SPECIAL ISSUE

Heart Rate Variability Biofeedback in the Treatment of Trauma Symptoms

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Recent research in the neurobiology of trauma supports the likelihood of more effective treatment with the inclusion of somatic techniques such as heart rate variability biofeedback. In this article, an argument is made for integration of heart rate variability biofeedback with cognitive behavioral techniques in the treatment of posttraumatic stress disorder. Some preliminary results are reported together with a detailed case history.

Heart rate variability (HRV) biofeedback has been used for a number of clinical syndromes and as an aid to performance (Gevirtz, 2007; Lehrer, 2007). More recently, we have begun to explore the use of HRV biofeedback for the reduction of trauma-related symptoms, including depression. Recent work in the trauma field has pointed to the need to integrate somatic techniques into the empirically based cognitive techniques such as cognitive behavioral therapy (CBT), acceptance commitment therapy (ACT), and dialectical behavioral therapy (van der Kolk, 2001, 2006).

A leading figure in the field has stated: “Interoceptive, body oriented therapies can directly confront the core clinical issue in PTSD [posttraumatic stress disorder]: Traumatized individuals are prone to experience the present with physical sensations and emotions associated with the past. . . . For therapy to be effective it might be useful to focus on the patient’s physical self-experience and increase their self-awareness, rather than focusing on the *meaning* that that people make of their experience—their narrative of the past” (van der Kolk, 2006, p. 289).

Based on our experience and the neurobiological model of PTSD that has emerged in the last several years, we have been using HRV biofeedback as an adjunct to exposure-type therapies with considerable clinical success. We now have preliminary data from some controlled trials to reinforce our clinical case studies.

The core clinical approach to our proposed integration of cognitive-behavioral and neurobiological methodologies builds on findings that the brain deals with novel dangers by taking advantage of a system that has been evolutionarily designed to respond to threatening situations (cf. LeDoux,

2002). Once the danger categorization has been made, the outputs of the system are predetermined—changes in blood pressure, decrease in heart rate variability, etc. Prolonged exposure to these changes appears to be problematic in itself, as, for example, in heart disease (Curtis & O’Keefe, 2002). However, through complex processes that are not entirely known, the physiological changes also create a feedback loop that informs the cognitive system that the body is still endangered. By integrating the neurobiological and the cognitive-behavioral techniques, we hope to metaphorically grab hold of both input and output simultaneously. As improved cognition aids in the success of the biofeedback techniques, so should the calmed physiology help in the acceptance of the cognitive changes.

In practice, the Trauma Research Institute protocol for treatment of PTSD has four components: psychoeducation, CBT (Foa & Meadows, 1997; Foa, Rothbaum, Riggs, & Murdock, 1991), ACT (Orsillo & Batten, 2005), and HRV biofeedback (cf. Lehrer, 2007). As stated, it is believed that each component reinforces and augments the effectiveness of the other components. For example, effective CBT has been shown to increase HRV (Nishith et al., 2003). In an ongoing trial in our clinic, clinically significant improvements in PTSD symptoms have been achieved for 24 of 27 (88%) consecutive patients. Twenty-two of the 27 patients achieved their clinical goals within the 3-month protocol, two patients met their goals after an additional 3 months, and three patients did not drop below clinically significant cutoffs. The basic components are illustrated in the case below.

Case Study

David was a 46-year-old craftsman developing his own contracting business. During a repair job, he had been the victim of an explosion caused by employees who did not follow proper safety precautions. David developed PTSD, complicated by substance abuse, and attempted supportive psychotherapy to alleviate his symptoms. After 6 months, he had no decrease in symptoms and had an increase in associated agoraphobia.

In David's initial five sessions, he told his story and analyzed the triggers leading to his traumatic reexperiencing of the event. He recognized his substance abuse as an attempt at avoidance. Using the principles of ACT, he was encouraged to accept his anxiety rather than attempt to suppress it (or drink it away). Psychoeducation regarding the biology of PTSD aided David in seeing the process as normal, rather than as a failure of will.

At the end of the initial five sessions, David and his therapist developed a series of bullet points representing his story. These bullet points were used in two ways. First, David made a tape of the bullet points that he could replay, and he used the tape as he practiced breathing with a StressEraser, a handheld HRV biofeedback device. Second, he read and reread a written version of the bullet points in his therapist's office while being monitored by HRV monitoring (in this case the Freeze-Framer by HeartMath, Boulder Creek, CA) for the last 15 minutes of each session.

David also was asked to tell his story in the classic manner of in vivo exposure, with emotional content and present tense. When David paused in his narrative, the therapist noted the content of the story. After the narrative was concluded, David was taken back to the pause points and was asked for his cognitions. David's most problematic cognitions centered on the degree to which he felt that he could not trust others and could not control his own destiny. These cognitions were recognized as relevant to his prior attachment history and were processed using ACT principles (i.e., by acceptance, understanding, and recognition of what behavioral actions could be taken to improve his safety).

David's PTSD symptoms dropped from T scores above 75 on Hyperarousal, Defensive Avoidance, and Re-Experiencing, scales in the Trauma Symptom Inventory (Briere, 1995), to T scores under 50 in 3 months. He was no longer troubled by agoraphobia and reported that his drinking was back under control. He chose to complete another 6 months of therapy to focus on attachment-related distrust before termination.

Conclusion

Though more research is badly needed in this area, our preliminary findings seem to indicate that adding HRV biofeedback to multicomponent, trauma-focused CBT delivers a clinically meaningful gain in treatment effectiveness. In another trial in our lab, Brooke White is finding that adding a StressEraser to supportive therapy for trauma symptoms in military veterans is producing noticeable gains beyond those produced by a progressive muscle relaxation intervention.

We hope that the recently created spate of trauma victims from our occupation in the Middle East will spur on research that will enable us to better treat the devastating symptoms associated with trauma exposure, or even better, to find out what skills might protect our personnel before they experience the symptoms that are so personally and financially costly.

References

- Briere, J. (1995). *Manual for the Trauma Symptom Inventory*. Odessa, FL: Psychological Assessment Resources.
- Curtis, B. M., & O'Keefe, J. H., Jr. (2002). Autonomic tone as a cardiovascular risk factor: The dangers of chronic fight or flight. *Mayo Clinic Proceedings*, 77, 45–54.
- Foa, E. B., & Meadows, E. A. (1997). Psychosocial treatments for posttraumatic stress disorder: A critical review. *Annual Review of Psychology*, 48, 449–480.
- Foa, E. B., Rothbaum, B. O., Riggs, D. S., & Murdock, T. B. (1991). Treatment of posttraumatic stress disorder in rape victims: A comparison between cognitive-behavioral procedures and counseling. *Journal of Consulting and Clinical Psychology*, 59, 715–723.
- Gevirtz, R. N. (2007). Psychophysiological perspectives on stress-related and anxiety disorders. In P. M. Lehrer, R. L. Woolfolk, & W. E. Sime (Eds.), *Principals and practice of stress management* (3rd ed.). New York: Guilford Press.
- LeDoux, J. E. (2002). *The synaptic self*. New York: Viking Press.
- Lehrer, P. M. (2007). Biofeedback training to increase heart rate variability. In P. M. Lehrer, R. L. Woolfolk, & W. E. Sime (Eds.), *Principles and practice of stress management* (3rd ed.). New York: Guilford Press.
- Nishith, P., Duntley, S. P., Domitrovich, P. P., Uhles, M. L., Cook, B. J., & Stein, P. K. (2003). Effect of cognitive behavioral therapy on heart rate variability during REM sleep in female rape victims with PTSD. *Journal of Traumatic Stress*, 16, 247–250.
- Orsillo, S. M., & Batten, S. V. (2005). Acceptance and commitment therapy in the treatment of posttraumatic stress disorder. *Behavior Modification*, 29, 95–129.
- van der Kolk, B. A. (2001). The psychobiology and psychopharmacology of PTSD. *Human Psychopharmacology*, 16, S49–S64.
- van der Kolk, B. A. (2006). Clinical implications of neuroscience research in PTSD. *Annals of the New York Academy of Sciences*, 1071, 277–293.



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