

## EDITORIAL

# Distinguishing Mild Traumatic Brain Injury and Stress Responses: Implications for Heart Rate Variability Biofeedback Training

Leah Lagos, PsyD

Private Practice, New York, NY

Keywords: traumatic brain injury, heart rate variability biofeedback, neurofeedback, postconcussion syndrome, posttraumatic stress disorder

*Recent research has noted a significant overlap between symptoms of posttraumatic stress disorder (PTSD) and postconcussion syndrome (PCS). In this article, an argument is made for providing a specialized form of heart rate variability biofeedback that allows for the physiological discharge of trauma among patients who present with comorbid symptoms of PTSD and PCS. Recommendations for clinicians who encounter the manifestation of trauma during their work with PCS patients are provided. Future areas of heart rate variability biofeedback research among PCS and PTSD populations are further delineated.*

The study by Kim and colleagues in this issue of *Biofeedback* highlights the prevalence of individuals who continue to experience symptoms beyond the 3-month period following traumatic brain injury (TBI). The findings demonstrate that heart rate variability (HRV) biofeedback helps to reduce emotional lability and improve concentration among this afflicted population. Although the study provides evidence for the benefits of HRV biofeedback in post-TBI recovery, it also raises questions about whether the manifestation and release of trauma is an essential component of the healing process among some PCS patients.

A classic feature of mild TBI, and noted cause for impairment following injury, is postconcussion syndrome (PCS). Symptoms may include challenges with memory, attention, balance, ringing in the ears, sensitivity to light or sound, depression, and anxiety. The veracity of this diagnosis, however, is often questioned due to the overlap between symptoms of PCS and posttraumatic stress disorder (PTSD). A recent study by Dikmen, Machamer, and Temkin (2001), for instance, found that 50% of participants in a traumatic brain injury group reported three or more PCS symptoms. A noteworthy 24% of the

trauma comparison group also complained of these symptoms. Misattribution of these symptoms to brain injury may have implications for HRV biofeedback training, leading a clinician to feel unprepared and/or surprised when trauma reactions manifest during HRV training with PCS patients.

As reported in previous research, patients who suffer from PTSD often experience a somatic “release” of trauma during HRV biofeedback (Whitehouse & Heller, 2010). Somatic Experiencing (SE) is a concept developed by Levine (1997), deriving from studies of how animals survive traumas by discharging the mobilized arousal in order to improve physiological functioning. He posits that trauma is “stored more in the nervous system than the event.” As such, trauma associated with TBI may be considered as energy stuck in an incomplete fight or flight sympathetic nervous system (SNS) response (which can also be understood as vagal withdrawal) or a “braking” impairment, which involves the underactivation of the parasympathetic nervous system (PNS) vagal response (Porges, 1995). Over-arousal from stuck, incomplete threat reactions disrupts normal regulatory functions. Discharging the overarousal, which requires a cathartic exploration and release of emotions, can improve physiological functioning in and of itself. One approach, therefore, for further exploration would be to implement HRV biofeedback protocols for trauma patients with patients who present with comorbid diagnoses of PTSD and TBI (Whitehouse & Heller, 2010). The objective would be to integrate emotions, affective responses, and breathing skills to release the physiological correlate of the trauma from the body. For clinicians who do not have a background in treatment of trauma, a referral for cognitive behavioral therapy may be warranted during the cognitive manifestation of trauma. Based on the experience of this author, at least half of PCS

patients will experience a sudden emergence of trauma at approximately the third or fourth week of HRV training.

To advance our understanding of PTSD and TBI, it will be critical for future studies to assess for PTSD when designing and implementing heart rate variability biofeedback research. The next task will involve designing studies to compare the utility of heart rate variability biofeedback and specialized heart rate variability biofeedback protocols for trauma on the reduction of PTSD and PCS symptoms. Ideal designs would be prospective, following individuals from the time of injury to 12 months or longer into the future. Outcome measures should be symptomatic and functional, and should be combined with QEEG imaging and HRV measures to evaluate the potential neurological changes that occur due to the restoration of physiological functioning as well as the somatic release of trauma.

## References

- Dikmen, S., Machamer, J., & Temkin, N. (2001). Mild head injury: Facts and artifacts. *Journal of Clinical Neuropsychology*, *23*, 729–738.
- Kim, S., Rath, J. F., McCraty, R., Zemon, V., Cavallo, M. M., & Foley, W. W. (2015). Heart rate variability biofeedback, self-regulation, and severe brain injury. *Biofeedback*, *43*(1), 6–14.
- Levine, P., & Fredrick, A. (1997). *Waking the tiger: Healing trauma*. Berkeley, CA: North Atlantic Books.
- Porges, S. (1995). Orienting in a defensive world: Mammalian modification of our evolutionary heritage. A polyvagal theory. *Psychophysiology*, *32*, 301–318.
- Whitehouse B., & Heller, D. P. (2010). Heart rate in trauma: Pattern found in somatic experiencing and trauma resolution. *Biofeedback*, *36*, 24–29.



Leah Lagos

Correspondence: 635 Madison Avenue, Fourth Floor, New York, NY 10022, email: leahmlagos@gmail.com.

---