Heart rate variability biofeedback, executive functioning and chronic brain injury
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Primary objective: To determine if individuals with brain injury can modify heart rate variability (HRV) through biofeedback and, if so, enhance its pattern to improve emotional regulation and problem-solving ability.

Design: A quasi-experimental design with repeated measures was employed. Thirteen individuals aged 23–63 years with severe brain injury (13–40 years post-onset) participating in a community-based programme were enrolled.

Main outcomes: Response-to-treatment was measured with HRV indices, Behavior Rating Inventory of Executive Function (BRIEF-A-Informant) and attention/problem-solving tests.

Results: At post-treatment, HRV indices (Low Frequency/High Frequency [LF/HF] and coherence ratio) increased significantly. Increased LF/HF values during the second-half of a 10-minute session were associated with higher attention scores. Participants who scored better (by scoring lower) in informant ratings at pre-treatment had highest HRV scores at post-treatment. Accordingly, at post-treatment, families’ ratings of participants’ emotional control correlated with HRV indices; staffs’ ratings of participants’ working memory correlated with participants’ HRV indices. Self-ratings of the BRIEF-A Task Monitoring scale at post-treatment correlated with family ratings at pre-treatment and post-treatment.
Conclusions: Results demonstrate an association between regulation of emotions/cognition and HRV training. Individuals with severe, chronic brain injury can modify HRV through biofeedback. Future research should evaluate the efficacy of this approach for modifying behavioural problems.

Keywords

Heart rate variability (HRV) biofeedback, executive functioning, brain injury