

The Role of Heart Rate Variability in Individuals Living with Chronic Pain: The Heart Does Not Lie

Jessica Choe, M.S.,
Barry Nierenberg, Ph.D.

INTRO

- The United States is currently facing two interrelated epidemics: the opioid and chronic pain epidemic.
- A growing body of psychological research seeking the underlying factors contributing to the development of opioid use supports an association between Heart Rate Variability (HRV) and the various outcomes relevant to the coping mechanisms of chronic pain.
- To keep psychologists better informed regarding the role of HRV in pain regulation and how that impacts individuals and their psychological outcome, a literature review was conducted.

METHODS

- A literature review was carried out using PubMed and PsychINFO to identify empirical peer reviewed articles published in English from the years 2009 and 2019 with the following keywords in combination: *heart rate variability (HRV), emotional regulation, dysregulation, coping, chronic pain, pain, endogenous opioid, opioid*
- The exclusion criteria
 - Qualitative and interview methods
 - Children and adolescents
- The inclusion criteria
 - Articles focusing on pain, emotional regulation, and HRV

Individuals with chronic pain seem to display reduced heart rate variability (HRV), characterized by negative adaptive coping abilities, dysregulation of emotion, and hypersensitivity in pain experiences.

Chronic pain management focusing on improving HRV, along with psychological well-being and self-management of chronic pain, may prove to be effective as a more biopsychosocial or non-opioid treatment approach.



Figure 1. HRV at rest with chronic pain.



Figure 2. HRV after shifting emotion objectively with HRV biofeedback.

Gharido et al., 2019

RESULTS

- Altered activity of neural structures (e.g., prefrontal cortex, amygdala, periaqueductal gray) responsible for autonomic control and pain perception are shown in chronic pain patients.
- Impaired autonomic function, such as decreased vagal activity or decreased parasympathetic activation, in chronic pain is linked to a change in affective emotion regulation of pain.
- Reduced HRV (or reduced HF-HRV) is associated with reduced emotion regulation capacity and fear/threat perception.
- Results suggest that the descending inhibitory pain pathway (i.e., endogenous pain-suppressing/opioid system) is disrupted in chronic pain and can be indexed by the association between HRV (reduced) and reports of pain (e.g., hyperalgesia).

DISCUSSION

- Results suggest that HRV can be a promising measure of changes in heart reactivity in response to pain mediated by emotional factors.
- HRV may be used to assess negative adaptive coping capabilities, including an individual's emotional regulation when managing pain, which can be linked to mental and physiological health outcomes, such as opioid use disorder, depression, and heart disease.
- HRV can help psychologists take a lead in treatment of pain based on a biopsychosocial model to not only address the biological basis of symptoms in emotional dysregulation (e.g., biofeedback, HRV-focused deep breathing), but to also incorporate a full range of psychological and behavioral factors in assessing what dynamically affect the individual's pain, distress, and disability.
- Understanding the role of HRV in chronic pain could lead to a tailored management of prevention and an improvement of treatment for individuals living with chronic pain.