Neurovisceral Integration: Implications for Psychopathology

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The autonomic nervous system (ANS) plays a role in a wide range of somatic and mental diseases. Using a model of Neurovisceral Integration I will describe how autonomic imbalance and decreased parasympathetic tone in particular may be the final common pathway linking negative affective states and conditions to ill health. The central nervous system (CNS) network that regulates autonomic balance is closely related and partially overlaps with networks serving executive, social, affective, cognitive, and motivated behavior. A common reciprocal inhibitory cortico-subcortical neural circuit serves to regulate defensive behavior including autonomic, affective, and cognitive features. This inhibitory cortico-subcortical circuit may structurally as well as functionally, link psychological processes with health-related physiology. When the prefrontal cortex is taken “offline” for whatever reason, parasympathetic inhibitory action is withdrawn and a relative sympathetic dominance associated with disinhibited defensive circuits is released, which can be pathogenic when sustained for long periods. This state is indicated by low heart rate variability (HRV), which is a marker for low parasympathetic activation and prefrontal hypoactivity. Consistent with this, HRV is associated with a range of psychological and somatic pathological conditions. I will discuss supportive evidence from recent studies of neuroimaging, the reflexive startle blink, attention, and working memory, which shows the low HRV predicts hypervigilance and inefficient allocation of attentional and cognitive resources.