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A WEARABLE HEART MONITOR FOR MEASURING CHANGES OF THE SYMPATHETIC NERVOUS SYSTEM

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Descriptors: Impedance, Methods, Autonomic

Quantifying sympathetic nervous system activity (SNS), including cardiac mobilization, provides insight into motivational states, stress reactivity, reward sensitivity, task engagement and decision making. Typically, electrocardiogram (ECG) and impedance cardiography (ICG) are combined to estimate pre-ejection period (PEP) and index changes in SNS. Current methods of ICG are time intensive and vulnerable to non-reproducible subject-specific electrode configuration. Analysis of impedance waveforms can also suffer from experimenter bias. Here we present a simple wearable heart monitor that includes ECG, but replaces the 8 ICG electrodes with a single accelerometer (ACC). The ACC indirectly measures movement of the heart by sensing the arterial pulse as blood is ejected into the aorta. The final ACC waveform consists of two smooth waves, the first peak indicating the opening of the aortic valve, and the second indicating its closing. To test the ACC's reliability, participants were fitted with ECG, ICG, and ACC as they engaged in classic physical stress tasks known to modulate SNS: the Valsalva maneuver and cold pressor. Linear mixed effects models showed significant associations between ICG and ACC's PEP derivatives with respect to time (p less than .01). These findings support ACC as an improved method for tracking SNS that is robust, time efficient, and accessible to all researchers.

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REDUCED HEART RATE VARIABILITY IS ASSOCIATED WITH VULNERABILITY TO DEPRESSION AND IMPAIRED ATTENTIONAL CONTROL TO UNPLEASANT AFFECTIVE STIMULI

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Descriptors: Heart Rate Variability, Depressive Symptoms, Cognitive Control of Emotional Information

The autonomic nervous system is implicated in cognitive and affective modulation. Heart rate variability (HRV) reflects cardiac autonomic modulation and it is reduced in psychopathology. Dysphoria and remitted depression are conditions of vulnerability to depression. The study investigated whether reduced HRV may represent an indicator of vulnerability to depression and its implication in the association between HRV and attention control of emotional information. Two at-risk populations [dysphoria ($n = 27$), remitted depression ($n = 16$)] and a healthy control group ($n = 25$) performed an emotional Stroop task (EST) and three-minute resting-state ECG. Analysis of covariance was conducted to detect between-groups differences. Correlation analysis was conducted between response times (RTs) and interference indexes at the EST and HRV. Standard Deviation of Normal to Normal intervals (SDNN) and High Frequency (HF) power of HRV were reduced in both at-risk groups as compared with controls, whereas no significant effect in the EST was noted. Correlation analysis on the whole sample revealed significant inverse correlations between both HRV parameters and RTs and interference index for unpleasant words. The findings suggest that vulnerability to depression is characterised by reduced vagal tone. In the whole sample, reduced vagal tone was correlated with cognitive-emotional interference for unpleasant words. Thus, parasympathetic prevalence might facilitate the ability to overcome interference from unpleasant emotional distractors and to direct attention on relevant stimuli.

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DISTINCT INFLUENCE OF ANXIETY AND ALEXITHYMIA ON THE OBJECTIVE AND SUBJECTIVE ESTIMATES OF INDIVIDUAL EFFICACY IN HEARTBEAT DETECTION TASK

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Descriptors: Interoception, Anxiety, Alexithymia

Currently, there is an increasing body of data linking interoception and emotion. The same time, there is a call for separate evaluation of the role of emotion in different aspects of interoceptive processing. In a sample of 25 females undergoing fMRI-based heartbeat detection task, we evaluated both an objective behavioral measure of task-related efficacy—interoceptive accuracy (IAc), and a subjective estimate of the efficacy in heartbeat detection (SEf), self-rated by a questionnaire after the task. The same day participants completed the Spielberger State-Trait Anxiety Inventory and Toronto Alexithymia Scale 20. The IAc and SEf appeared to show no correlation ($R_o = -0.1$, $p = 0.6$), and only the IAc was associated with typical fMRI interoceptive activation. Path analysis revealed that the IAc was positively influenced by the state anxiety and negatively—by the trait anxiety and alexithymia. The same time, SEf was positively influenced by the alexithymia and negatively—by the both state and trait anxiety. Higher levels of state anxiety resulted in increased IAc but decreased SEf, which can be related to the increased attention to internal signals and, the same time, to lower self-efficacy. Higher level of alexithymia resulted in decreased IAc but increased SEf. We propose that alexithymia may interfere with the ability to judge one's own performance during the interoceptive task, leading to a mismatch in subjective and objective estimates of efficacy.

Poster 2-030

CEREBELLAR SEEDED FUNCTIONAL CONNECTIVITY NETWORKS IN ANXIOUS INDIVIDUALS

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Descriptors: Anxiety, Cerebellum

New and converging research provides empirical evidence that the cerebellum's functional connectivity and shared network structure with threat processing regions have a direct impact on anxiety and its symptomatology. The aim of the current study was to assess the functional role of the cerebellum in anxiety and its symptomatology by assessing its functional connectivity to threat processing regions, as well as its connectivity patterns within resting-state networks. Participants ($N = 100$) were between the ages of 18 and 42, right-handed, free of any neurological history, and were not undergoing any form of psychological therapy or medications. The current study utilized resting-state functional magnetic resonance imaging (rsfMRI) collected over a 10-min time span. The scans were then used to analyze data to assess general cerebellar connectivity in this high anxiety sample, as well as associations between cerebellar activity and variability in anxiety symptoms. The results showed strong, widespread cerebellar functional connectivity with regions previously implicated in both motor and cognitive processing. Moreover, there was a connection between cerebellar seed regions and regions associated with threat processing. In addition, levels of cerebellar connectivity within this network were related to levels of anxiety. The results provide empirical evidence demonstrating strong functional connectivity between the cerebellum and threat-processing regions as well as evidence for the role of the cerebellum in anxiety symptomatology.