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Objective: Executive functions (EF) are a primary mediator of both typical and atypical functioning, influencing the progression of psychopathology due to their role in supporting self-monitoring/regulation and top-down control of cognitive processes. According to recent models, EF impairments may contribute to the functional decline of patients with substance use disorder (SUD), exacerbating secondary affective and social symptoms. Despite these potential implications, the tools now commonly used to outline neurocognitive, and specifically EF, impairments in patients with addiction are not tailored to this clinical population, having been developed to assess cognitive or dysexecutive deficits in neurology or geriatric patients. Because of their different clinical focus, such tools are frequently unable to fully delineate the dysfunctional EF profile of addiction patients. We here present the development and validation of a novel specific screening battery for executive disorders in addiction: Battery for Executive Functions in Addiction (BFE-A).

Participants and Methods: 151 SUD patients and 55 control persons were recruited for the validation of the BFE-A battery. The battery consists of two computerized neurocognitive tasks (Stroop and Go/No-go tasks) and five digitalized neuropsychological tests (focus: short/long-term memory, working memory, focused attention, verbal/non-verbal cognitive flexibility). The tests are designed to assess executive control, inhibition mechanisms, and attention bias toward drugs of abuse.

Results: In tests of verbal memory, focused attention, and cognitive flexibility, as well as in computerized tasks, inferential statistical analyses revealed lower performance in SUD patients compared to control participants, indicating a lack of inhibitory processes and dysfunctional management of cognitive resources. The investigation of Cohen's d values has revealed that inhibitory control, verbal/nonverbal fluency, and short/long-term memory are the areas with the most significant impairments.

Conclusions: While the evaluation of EF dysfunctions associated to addiction is a currently underrepresented component of the diagnostic procedure in drug assistance/treatment programs, is also is an essential step for both profiling of patients and design of rehabilitation protocols. Clinical interviews should be complemented by early assessment of cognitive weaknesses and preserved EF skills in order to establishing personalized therapy strategy and perhaps organizing a concurrent phase of cognitive rehabilitation.

Categories: Addiction/Dependence
Keyword 1: addiction or dependence
Keyword 2: assessment
Keyword 3: test development
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9 Interoceptive Attentiveness: Evidence for Neurofunctional Correlates from an EEG Source Localization Study

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Objective: Since seminal work by Sherrington, the term interoception refers to the ability to sense modifications of internal bodily states as opposed to the ability to sense stimuli coming from outside the body itself. Despite conceptual changes regarding the afferent signals subserving this type of inner perception, the core of this definition is still valid and widely accepted. The critical contribution of internal state perception to self-regulation as well as higher-order cognitive processes has led to the

development of psychometric and observational measures trying to capture individual interoceptive skills, focusing especially on the ability to orient attention to internal sensations. Nonetheless, despite growing interest in interoceptive attention (IAtt), little is known about neurofunctional correlates of our ability to redirect attention to internal sensations and consciously process them, as well as on potential objective biomarkers of IAtt performance.

Participants and Methods: This study included 36 volunteers who were asked to complete a heart-beat counting task (HCT), a common IAtt task. During both resting-state and HCT, central electrophysiological (EEG, 32 electrodes) and cardiovascular activity (ECG, I lead) were recorded. eLORETA was used to estimate both task-related and resting-state intracortical sources of EEG signals. Statistical non-parametric mapping (SnPM) was used to draw and investigate contrast statistical maps between rest- and task-related cortical current density.

Results: Contrast analyses comparing HCT and resting revealed higher Alpha frequency current density estimates during the task, with primary cortical seed in the right parahippocampal gyrus. Regression analyses of the relationship between IAtt scores and task-related changes in intracortical current density during HCT revealed a positive relationship for the Beta frequency bands with primary cortical seeds in the cingulate gyrus and insula.

Conclusions: Findings add to available literature by further specifying the electrophysiological signature of interoceptive attentiveness, and suggest specific electrophysiological markers as objective measures of individual IAtt skills.

Categories: Cognitive Neuroscience
Keyword 1: electroencephalography
Keyword 2: awareness
Keyword 3: sensory integration
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10 Pupil Dilation During the Stroop Task Offers a Sensitive and Scalable Biomarker of Locus Coeruleus Integrity

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Objective: Neuronal dysfunction of the locus coeruleus (LC), the primary producer of norepinephrine, has been identified as a biomarker of early Alzheimer's disease (AD) pathophysiology. Norepinephrine has been implicated in attentional control, and its reduced cortical circulation in AD may be associated with selective attentional difficulties. Additionally, greater pupil dilation indicates greater effort needed to perform a cognitive task, and greater compensatory effort to perform the digit span task has been found in individuals at risk for AD. In this study, we examined associations between a neuroimaging biomarker of the LC and pupil dilation during the Stroop task as a sensitive measure of attentional control.

Participants and Methods: 64 older adults without dementia were recruited from the San Diego community (mean [SD] age = 74.3 [6.3]; 39 cognitively unimpaired and 25 with mild cognitive impairment). All participants underwent magnetic resonance imaging of the LC and generated behavioral data from a computerized Stroop task that included 36 incongruent trials (e.g., GREEN presented in red ink), 36 congruent trials (e.g., GREEN presented in green ink), and 32 neutral trials (e.g., LEGAL presented in green ink) in a randomized presentation. Mean pupil dilation for each trial (change relative to baseline at the start of each trial) was measured at 30 Hz using the Tobii X2-30 system (Tobii, Stockholm, Sweden) and averaged within each Stroop condition. Paired t-tests assessed for differences in mean pupil dilation across incongruent and congruent Stroop conditions. Iterative re-weighted least squares regression was used to assess the association between a rostral LC contrast ratio measure derived from manually marked ROIs and mean pupil dilation during incongruent trials