Biomarkers of Craving in Daily-Life: Further Evidence for an Autonomic Craving Signature across Addiction Types Unlocking the Potential for Better Personalized Interventions.

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Abstract (300/300)

Aim: Within subject craving changes has been prospectively associated to substance use and relapse making it a target of choice for treatment interventions. However, as a subjective and fluctuating phenomenon it is monitored through self-reports that may be difficult for some subjects to report and sustain overtime. The need for an objective identification of craving across all addiction types is critical for more efficient treatment and of major interest for advancing our understanding of craving mechanisms. This study aimed to further identify physiological signals of craving, previously reported in daily-life as the Autonomic Craving Signature.

Methods: In a 14-day observational study, individuals of both sexes, with substance use disorders for alcohol, tobacco and cannabis were monitored using EmbracePlus wearable physiological sensors (blood volume pulse, accelerometry, electrodermal activity and skin temperature) and ecological momentary assessment (EMA) for craving. Principal component analysis (PCA) and machine learning classifiers were used to distinguish craving from non-craving periods.

Results: The protocol was completed by 73 participants, with a mean age of 33.9 years and 54.41% women, contributing 3,116 EMA responses (83.05% completion rate) and 10,173 hours of physiological data (10.6 hours/day per participant). Among the analyzed data, 37.5% were related to tobacco, 37.5% to cannabis, and 25% to alcohol users. PCA identified thirty-one principal components explaining 99% of variance. Electrodermal activity and heart rate variability emerged as key signals shared across addiction groups. Linear Discrimination Analysis enabled craving discrimination with an accuracy of 69.22% (p=0.01).

Conclusions: The performance of the classifiers supports the feasibility of identifying craving in daily-life from physiological data, hence supporting the development personalized and precision interventions based on craving-specific physiological signals. These findings pave the

way for objective craving detection and novel just-in-time adaptive interventions targeting craving without the need for sustained craving awareness by the patient which may increase treatment effectiveness and patient adherence.

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Key words: Addiction; Biomarker, Wearable Sensor; Ecological Momentary Assessment; Craving; Variability of Heart Rate; Electrodermal Activity