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Psychological Flow Related Indices Related to Heart Rate Rhythm

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The significance of the continuous daily healthcare monitoring through IoT devices has been widely recognized in order to maintain healthy and active mental state. In this study, we propose a method to examine if flow related psychological indices such as anxiety, self-esteem, will for meaningful life, resilience and self-efficacy could be associated with the heart rate daily rhythm to assess mental soundness. Continuous heart rate monitoring was made for 20 healthy subjects aged 25-57. We have found that two extracted heart rate rhythm parameters: 24-hour cosinor amplitude A24 and Autonomic Switching Rate ASR, defined as the maximum value of the derivative of the extracted double cosinor rhythm, are highly correlated with some of the psychological indices. Multiple regression analysis showed the highest correlation with the rhythm parameters (r=0.654). The result implies the heart rhythm parameters which IoT device provide could be objective indices for the assessment of mental health status.

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Investigation of Mindfulness Mechanism via Estimation of Mind-Wandering using Electroencephalogram

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Mindfulness-based interventions (MBI) might improve the controllability of mind-wandering (MW), that is, the ability to decrease MW frequency, to notice MW, and to shift attention from MW. This study investigated whether such controllability of MW mediates the effect of the mindfulness-based intervention (MBI) on depression. Since the MBI, which instructs participants to be aware of the occurrence of, and their engagement in, MW, might bias self-reports of MW, a measurement method that does not rely on subjects' verbal report is needed. Therefore, we estimated MW intensity using one-second electroencephalogram (EEG) samples and a machine learning model developed previously. We recorded EEG before and after MBI, and observed fluctuations in mind-wandering during a 14-minute meditation and quantified the three types of MW trait. The magnitude of the change of depressive symptom and ability to shift attention from MW were correlated. This MW trait is a plausible mediator between MBI and depression.