論 文 要 旨

Working Memory-Related Prefrontal Hemodynamic Responses in University Students: A Correlation Study of Subjective Well-Being and Lifestyle Habits

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Identification of social risk factors and the promotion of stress coping mechanisms and mental resilience are topics of interest in the field of mental health. The relationships between risk- or tolerability-associated factors and task-related hemodynamic responses in the prefrontal cortex (PFC) in adolescents may have important implications for mental health challenges. The purpose of this study was to investigate the relationship between task-related PFC hemodynamic activities and subjective well-being or lifestyle habits using wearable near-infrared spectroscopy (NIRS). In this study, after sample refinement to reduce heterogeneity, 20 university students were included in verbal working memory (VWM) task analyses and 21 were included in spatial working memory (SWM) task analyses. The task-related hemodynamic responses were detected using wearable NIRS. To assess the risk- or tolerability-associated factors, the levels of positive and negative affect were assessed using the Subjective Well-Being Inventory (SUBI) and lifestyle habits (such as gaming) were evaluated using a nine-item questionnaire. There was a positive correlation between SUBI positive affect and VWM task-related oxy-hemoglobin signal changes in the right dorsolateral PFC (DLPFC), underlining the significance of subjective well-being as an important independent emotional domain and suggesting the possibility of the differential objective evaluations of subjective well-being in the right PFC. Negative correlations between PFC activities during both VWM and SWM tasks at the left DLPFC and the number of game playing days in 1 week were also statistically significant, suggesting the presence of modality-non- specific hemodynamic regulation by habitual game playing. Each correlation was still robust after the elimination of major confounding impacts. Although further replication studies are warranted to confirm these preliminary results, this investigation of the relationship between task-related PFC hemodynamic activities and emotional domains or lifestyle habits might have clinical significance with regard to primary prevention of mental health issues in university students. To our knowledge, this is the first demonstration of these relationships with the use of wearable NIRS, which enables measurement under near natural conditions and is easy to use in schools or workplaces.