Resting-state EEG in marathon runners compared to sedentary controls

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Abstract

Background: Previous studies have described various neuroplasticity effects of physical activity (PA). EEG studies have described effects mostly during or shortly after short bouts of PA. This is the first study to investigate the capability of EEG to display PA-induced long-lasting plasticity in runners compared to a sedentary control group. Methods: Thirty trained runners and thirty age- and sex-matched sedentary controls (SC) were included as a subpopulation of the ReCaP (Running effects on Cognition and Plasticity) study. PA was measured with the International Physical Activity Questionnaire (IPAQ). Resting state EEG of the runners was recorded in the tapering phase of the training for the Munich marathon 2017. Power spectrum analyses were conducted using standardized Low-Resolution Electromagnetic Tomography (sLORETA) and included the following frequency bands: delta: 1.5-6 Hz, theta: 6.5-8.0 Hz, alpha1: 8.5-10 Hz, alpha2: 10.5-12.0 Hz, beta1: 12.5-18.0 Hz, beta2: 18.5-21.0 Hz, beta3: 21.5-30.0 Hz and total power (1.5-30 Hz). Results: PA (IPAQ) and BMI differed significantly between the groups. The other included demographic parameters were comparable. Statistical non-parametric mapping showed no significant power differences in EEG between the groups. Discussion: Heterogeneity in study protocols, especially in time intervals between PA cessation and EEG recordings and juxtaposition of acute PA-induced effects on EEG in previous studies could be possible reasons for the differences in results. Future studies should record EEG at different time points after PA cessation and in a broader spectrum of PA intensities and forms to further explore the capability of EEG in displaying long-term PA-induced neuroplasticity.
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