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POSTER SESSION III-014 | EFFECTS OF ELECTROMAGNETIC SHIELDING IN ELECTRIC CARS ON EEG BRAIN ACTIVITY

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Recent research has demonstrated effects of electromagnetic field (EMF) exposure on EEG brain activity and cognitive performance. We investigated whether EMF shielding in the electric car reduces effects of EMF exposure on brain activity, heart rate variability (HRV), and electromyographic (EMG) activity. Participants were tested either in a control electric car or in an electric car that was prepared with EMF shielding (Gabriel-Tech GmbH, Germany). Measurements were taken in both car conditions under different EMF exposures (engine, air conditioning, navigation device, bluetooth mobile call, WiFi). Spontaneous EEG brain activity was recorded from 256 electrodes before, during, and after each experimental condition. EMF emissions were recorded continuously during all EEG measurements. Participants reported significantly more discomfort (nervousness, headache) with increased EMF emissions. Results showed increased beta and gamma activity in frontal and temporal regions under EMF exposure with most increases in the bluetooth mobile call and WiFi condition in the control car compared to the EMF shielded car. Further, data showed that brain activity involved large portions of the frontal and temporal lobes, and hippocampal areas. HRV (LF/HF ratio) decreased, EMG activity increased with higher EMF emissions. Results indicate that EMFs induced physiological changes that have adverse effects on the psychophysiological state, attentional performance, and metabolism of the brain during car driving. Application of EMF shielding in the electric car helps to reduce these effects.

Topics: 1.1 Human Studies: General Population - Adults, 2.1 Neuroimaging (EEG, fMRI, fNIRS etc.), 2.2 Myography (EMG etc.), 2.3 Cardio (HR, HRV, LVET, PEP), 3.3 Lab Based Experiment, 4.20 Attention, 4.26 Other

POSTER SESSION III-015 | HEART RATE VARIABILITY (HRV) AND GLAUCOMA: POTENTIAL PSYCHOPHYSIOLOGICAL INTERACTIONS AND RECOMMENDATIONS FOR TREATMENT AND INTERVENTIONS

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Open-angle glaucoma is a group of optic neuropathies characterized by dysfunction of the retinal ganglion cells (RCG), followed by irreversible RCG loss, leading to typical changes in the optic nerve head. Glaucoma can affect multiple brain functions and is the leading cause of irreversible blindness worldwide. Comorbidity with noncommunicable diseases such as cardiovascular disease, systemic blood pressure dysregulation or diabetes mellitus is high. It is associated with poor physical and psychological well-being due to the dramatic reduction in quality of life. Heart rate variability (HRV) is a robust cardiovascular indicator of autonomic nervous system (ANS) balance and resistance to allostatic load. HRV indices correlate positively with a person's ability to self-regulate, with physical and mental health, and well-being. In this scoping review, the authors discuss the association between HRV and glaucoma, with a focus on possible interactions of this relationship. Inclusion criteria for eligible studies, structure, rationale, method and outcome assessment follow the PRISMA recommendations. The results of the reviewed studies suggest that poor HRV at rest or in response to stressors is a potential risk factor for glaucoma and more severe progression of optic neuropathy, supporting the role of vascular dysregulation. Based on the results of the scoping review, recommendations for HRV interventions as adjuvant treatment in glaucoma patients are proposed and discussed.

Topics: 1.1 Human Studies: General Population - Adults, 2.3 Cardio (HR, HRV, LVET, PEP), 2.5 Hemodynamic (BP), 2.19 Other, 3.5 Secondary Analysis, 4.1 Aging, 4.5 Population-specific health, 4.7 Psychopathology

POSTER SESSION III-076 | BILATERAL HEMISPHERIC INTERPLAY WITH ADAPTIVE GABA AND GLX MODULATION SUPPORTS EFFECTIVE STRUCTURE LEARNING

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Structure learning (SL) training has been shown to influence cognitive flexibility (CF). However, relationships between neurochemical influence (GABA), shown to be related to learning with performance is less understood. We hypothesized shift in GABA levels post SL training and changes are correlated to cognitive flexibility. 108 matched participants assigned to control (C:54) and training (T:54) groups underwent GABA+ and Glx quantification on L- and R- DLPFC using MEGA-PRESS sequence in 3T-scanner and were administered colour shape task (CST) at pre- and post-training 2 weeks apart. Participants employing random strategies in SL (T:34) were excluded in this analysis. Post-training Glx was significantly (p=0.013) reduced in R-DLPFC of Treatment as compared to Control-group. Significant reduction in post-training GABA+ (p=0.033) was also only found in the T-group. The reduced Glx in R-DLPFC in T-group showed positive correlation (r=0.395, p=0.038) with switch cost in reaction time (RT) of CST. While in C-group, GABA+ in the R-DLPFC showed significant negative correlation (r= -0.303,p=0.045) with RT. GABA+ (r=0.413,p=0.026), Glx (r=0.526,p=0.002) in L-DLPFC showed significant relation with switch cost in accuracy(ACC) of CST in T-group. Relative change in(Δ) GABA+/Glx in R-DLPFC also had significant positive correlation (r=0.451,p=0.024) with ΔACC in T-Group, while ΔGABA+/Glx in L-DLPFC correlated positively (r=0.329,p=0.049) with ΔRT of C-group. Our findings showing correlation between neurochemical changes with improved CF further supports SL training to improve CF.

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Topics: 1.1 Human Studies: General Population - Adults, 2.1 Neuroimaging (EEG, fMRI, fNIRS etc.), 3.3 Lab Based Experiment, 4.22 Learning/conditioning, 4.25 Cognitive control/executive functions

POSTER SESSION III-077 | APPLICATION OF A SHIELDING CARD REDUCES EFFECTS OF SMARTPHONE-EMITTED RADIATION ON EEG BRAIN ACTIVITY

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Research shows that electromagnetic fields (EMFs) emitted by mobile phones induce systematic changes in EEG brain activity. In the present study, we investigated the effects of a shielding card (8.2 cm x 5.0 cm) that was placed on the surface of a smartphone when subjects were exposed to EMFs in the 5G range. Subjects were exposed to EMFs in the 5G range emitted by a smartphone (Apple iPhone 15) call for 30 minutes. We tested three experimental conditions in a randomized double blind design: (1) smartphone with shielding card (Gabriel-Tech GmbH, Germany), (2) smartphone without shielding card, (3) control condition without EMF exposure. High-density EEG was recorded from 256 electrodes before, during, and after each experimental condition, as well as mood assessed by POMS. EEG data showed increases in the beta and gamma bands in frontal, temporal, and occipital areas as well as in the hypothalamus and pineal gland with increased negative mood when subjects were exposed to smartphone-emitted 5G radiation compared to the control condition. EEG beta and gamma activity decreased significantly in frontal, temporal, and occipital areas as well as in the hypothalamus and pineal gland accompanied by improved mood scores when the shielding card was applied. Results indicate that application of an electromagnetic shielding card reduces effects on psychophysiological measures induced by smartphone-emitted EMFs in the 5G range.

Topics: 1.1 Human Studies: General Population - Adults, 2.1 Neuroimaging (EEG, fMRI, fNIRS etc.), 3.3 Lab Based Experiment, 4.26 Other (Ergonomics)

POSTER SESSION III-078 | IS SAVORING EFFECTIVE FOR BOTH LOW- AND HIGH-AROUSING POSITIVE STIMULI? AN ERP STUDY

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Savoring is a present-moment focused emotion regulation technique that involves increasing and sustaining positive emotion, by attending to and amplifying the pleasurable aspects of stimuli. Prior work has shown that savoring increases the late positive potential (LPP) and subjective ratings elicited by positive and neutral pictures. To date,