interactive effects warrant further attention in research and clinical settings.

NONINVASIVE BRAIN STIMULATION INCREASES THE COMPLEXITY OF RESTING-STATE BRAIN NETWORK ACTIVITY IN OLDER ADULTS

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Successful completion of cognitive and motor tasks requires functional interactions between numerous brain networks over multiple temporal scales. Biological aging reduces the multi-scale "complexity" of the spontaneous fluctuations in network activity. Still, it is unknown if such "resting-state" complexity is sensitive to functional status, or modifiable via intervention. We hypothesized that resting-state complexity is lower in older adults with functional limitations, and, that it can be increased via repeated exposure to transcranial direct current stimulation (tDCS). Twelve older adults with mild-to-moderate executive dysfunction (i.e., Trail Making Test B time below the 25th percentile of age- and education-based norm) and slow gait (i.e., gait speed <1.0m/s), along with 12 age- and sex-matched controls, completed a baseline resting-state fMRI. Ten participants within the functionally-limited group then completed a 2-week, 10-session tDCS (n=6) or sham (n=4) intervention targeting the left dorsolateral prefrontal cortex (dlPFC). A follow-up fMRI was acquired 2–3 days following intervention. The complexity of seven well-established functional networks was quantified by averaging the 'multiscale entropy' of the blood-oxygen-level-dependent time-series across all voxels within each network. Compared to controls, older adults with functional impairments exhibited lower complexity in the motor, ventral attention, executive and limbic networks ($F>4.7$, $p<0.04$). Within this group, exposure to real tDCS, compared to sham, increased the complexity within the executive and limbic networks ($F>4.9$, $p<0.04$). These results suggest the older adults with functional limitations exhibit lower resting-state complexity, and, that repeated exposure to tDCS targeting the left dlPFC may increase such complexity within this vulnerable cohort.

THE EFFECT OF ASSESSMENT LOCATION AND NUMBER OF ASSESSMENTS ON DRIVING PERFORMANCE OF PEOPLE WITH DEMENTIA

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Fitness-to-drive assessment are frequently used to determine if drivers with dementia can continue this valued activity. Assessments can be better tailored with research evidence to support the location of assessments (open or local area), method (self-directed or directed) and whether practice is beneficial (opportunity to undertake a second test), or which combination of these factors is best for drivers with, and without navigational difficulties. This study aimed to determine the effect of i) location of assessment, ii) method of assessment, and iii) practice, on driving test outcome for drivers both with, and without navigational problems. Forty-three clients (mean age 77 SD6.69) participated in a stratified randomized controlled trial. Client off-road driving tests included the OT-Drive Home Maze Test, and the on-road driving test outcome was recorded as pass or fail. Data were analyzed using a generalized linear mixed effects model. The 43 participants undertook a total of 93 on-road assessments and for clients with no navigational problems 20% failed the local and 33% failed the open route tests, as opposed to 58%(local) and 55%(open) for clients with navigational problems. Participants with navigational problems were 6 times more likely to fail the on-road test: B=-1.793 (95%CI-3.265 to-0.321), $p<0.01$. The OT-Drive Home Maze Test was a significant predictor of outcome on the on-road test, with slower times predictive of fail: B=-1.14, z=-2.219, $p=0.012$. In conclusion, driving test performance of people with dementia is not influenced by practice nor location. However, drivers with navigational problems are more likely to fail their on-road test.

DIFFERENCE IN BRAIN ACTIVATION WITH HIGHER TASK DEMAND IN ASYMPTOMATIC ADULTS WITH AND WITHOUT AN APOE E4 ALLELE

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Early Alzheimer's Disease (AD) can be difficult to diagnose with traditional cognitive assessment, but brain imaging studies suggest that people with early AD exhibit an altered metabolic response to certain tasks. This proof-of-concept study was designed to determine whether differences in brain metabolic activity with increasing task demand were related to one's risk of AD. We recruited 26 individuals (age 59–72) with prior genetic testing who had normal cognitive scores and no cognitive complaints. Because the APOE e4 allele is linked to higher risk and earlier onset of AD, we included 13 APOE e4 carriers (high risk group) and a demographically balanced sample of 13 APOE e4 non-carriers (low risk group). Participants performed executive control tasks while undergoing functional magnetic resonance imaging (fMRI). Participants performed an easier version (neutral condition) followed by a harder version (stress condition) of the task. Groups did not differ in accuracy or response time in the neutral or stress condition. Next, we considered the change in brain activation between neutral and stress conditions. The low risk group exhibited larger increases in activation in right frontoparietal regions, even after adjustment for age. Age was associated with greater neutral-to-stress-condition increase in activation, but the age effect was less pronounced in the high risk group. Our hypothesis is that recruitment of supplemental networks helps support executive control in late life, and early AD may interfere with engagement of these resources. Although less activation was not associated with worse performance here, performance deterioration may occur with more challenging tasks.