EEG correlates of visual short-term memory as neuro-cognitive endophenotypes of ADHD.

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Abstract
Attention deficit hyperactivity disorder (ADHD) frequently persists into adulthood. A reduction in visual short-term memory (vSTM) storage capacity was recently suggested as a potential neuro-cognitive endophenotype, i.e., a testable marker of an individual's liability for developing ADHD. This study aimed at identifying markers of the brain abnormalities underlying vSTM reductions in adult ADHD. We combined behavioral parameter-based assessment with electrophysiology in groups of adult ADHD patients and healthy age-matched controls.

Amplitudes of ERP markers of vSTM storage capacity, the contralateral delay activity (CDA) and the P3b, were analyzed according to (i) differences between individuals with higher vs. lower storage capacity K and (ii) differences between ADHD patients and control participants. We replicated the finding of reduced storage capacity in adult ADHD. Across groups, individuals with higher relative to lower storage capacity showed a larger CDA and P3b. We further found differences between the patient and control groups in the ERPs: The CDA amplitude was attenuated in an early time window for ADHD patients compared to control participants, and was negatively correlated with ADHD patients' symptom severity ratings. Furthermore, the P3b was larger in ADHD patients relative to control participants. These electrophysiological findings indicate altered brain mechanisms underlying visual storage capacity in ADHD, which are characterized by deficient encoding and maintenance, and increased recruitment of control processes. Accordingly, (quantifiable) ERP markers of vSTM in adult ADHD bear candidacy as neuro-cognitive endophenotypes of the disease.