The variability of EEG functional connectivity of young ADHD subjects in different resting states

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Objective
To assess ADHD from global measures of EEG functional connectivity and their temporal variability in different resting states

Methods
EEGs from sixteen cortical regions were recorded at rest during eyes-closed (EC) and eyes-open (EO) in 10 male combined-type ADHD subjects and 12 healthy male controls. The mean global connectivity (CM) of each region and its temporal variability (CV) were estimated from a number of EEG segments recorded in both states. Connectivity indices between regions were calculated using the magnitude squared coherence (Coh) in the delta(δ)/theta(θ)/alpha(α)/beta(β) frequency bands and the nonlinear index (L) of generalized synchronization.

Results
The CM did not present between-group differences in any region or state. However, the CV exhibited state-independent differences between both groups (ADHD>controls) mainly in frontal and parieto-occipital regions for all indices except Coh(α). Within group, only the CV-Coh(θ) of the centro-temporal region increased significantly for the ADHD subjects from EC to EO (p<0.001) and was greater than controls in EO (p<0.001).

Conclusions
The CV of index-L and of Coh(θ) seem to be the best state-independent and -dependent measurements, respectively, to discriminate ADHDS from control subjects using resting state EEG data.

Significance
The underlying neural dysfunctions producing the ADHD seem better reflected by the CV measurements.