

Periodic and Aperiodic Neural Activity Displays Age-Dependent Changes Across Early-to-Middle Childhood

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SUPPLEMENTARY MATERIALS AND METHODS

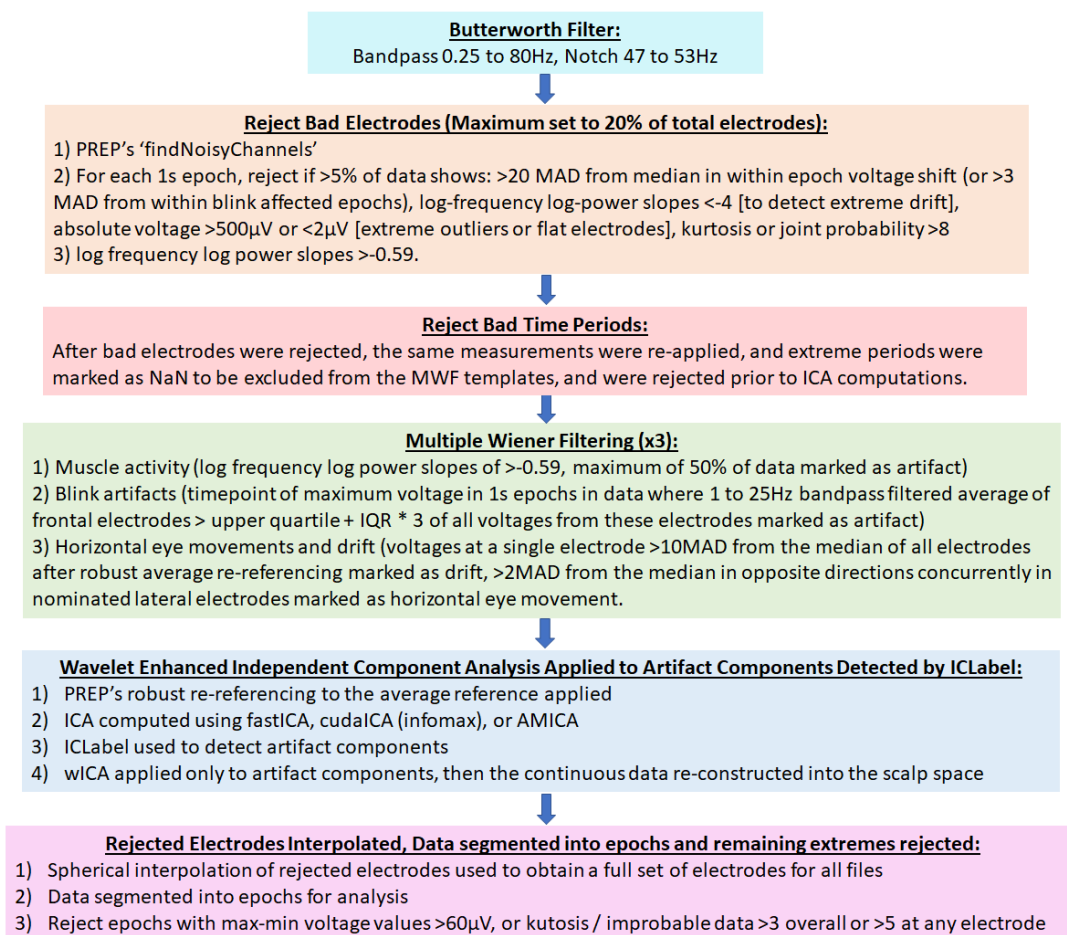


Figure S1. Overview of the typical steps involved in the Reduction of Electrophysiological Artefacts (RELAX) pipeline which was utilised to pre-process the resting-state EEG data (from Bailey *et al.*, 2021).

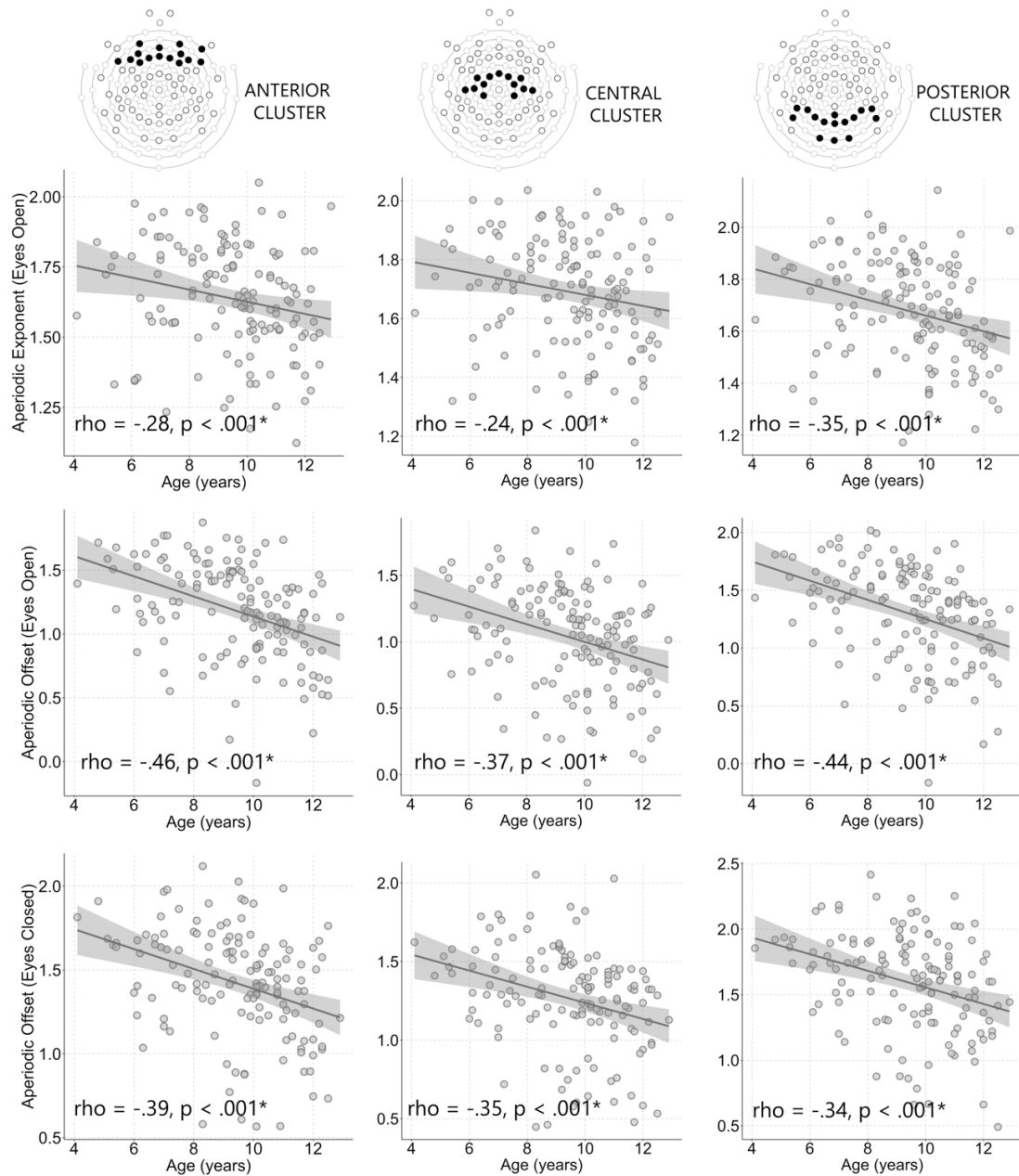


Figure S2: Correlations between age and either aperiodic exponent (eyes open), or offset (eyes open, eyes closed) for electrode clusters taken from anterior, central, and posterior regions. Regardless of the specific cluster used, there was a negative association between age and either aperiodic exponent, or offset.

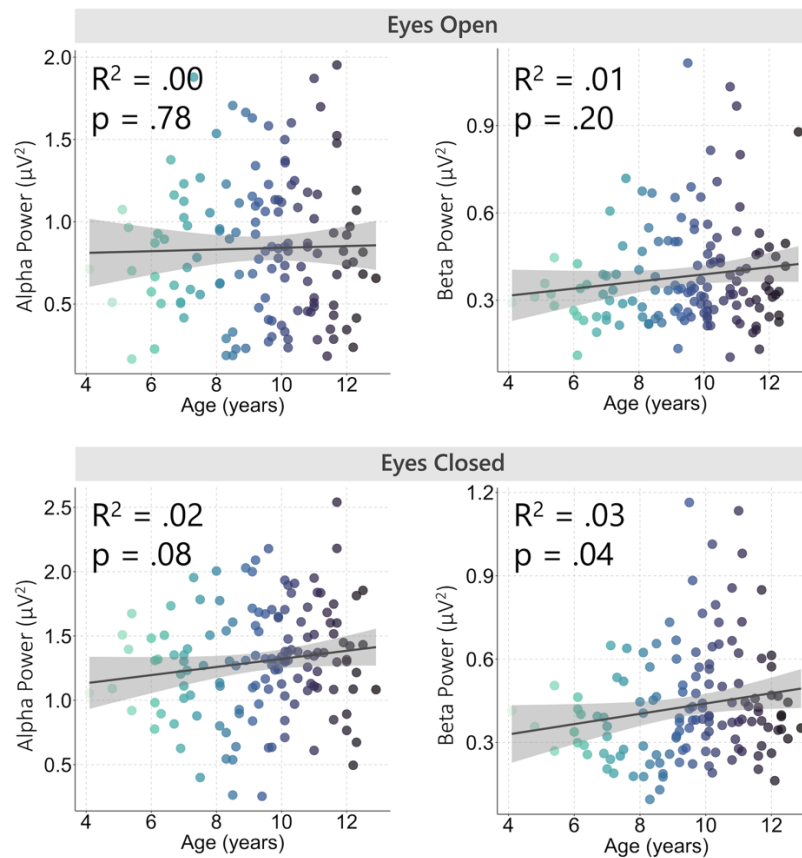


Figure S3: Scatter plots of spectral power in relation to age for the alpha and beta frequency bands. Significance values from the regression analyses are shown. Age was unable to significantly predict power within either the alpha or beta frequency ranges (after Bonferroni correction) for either the eyes open, or eyes closed data.

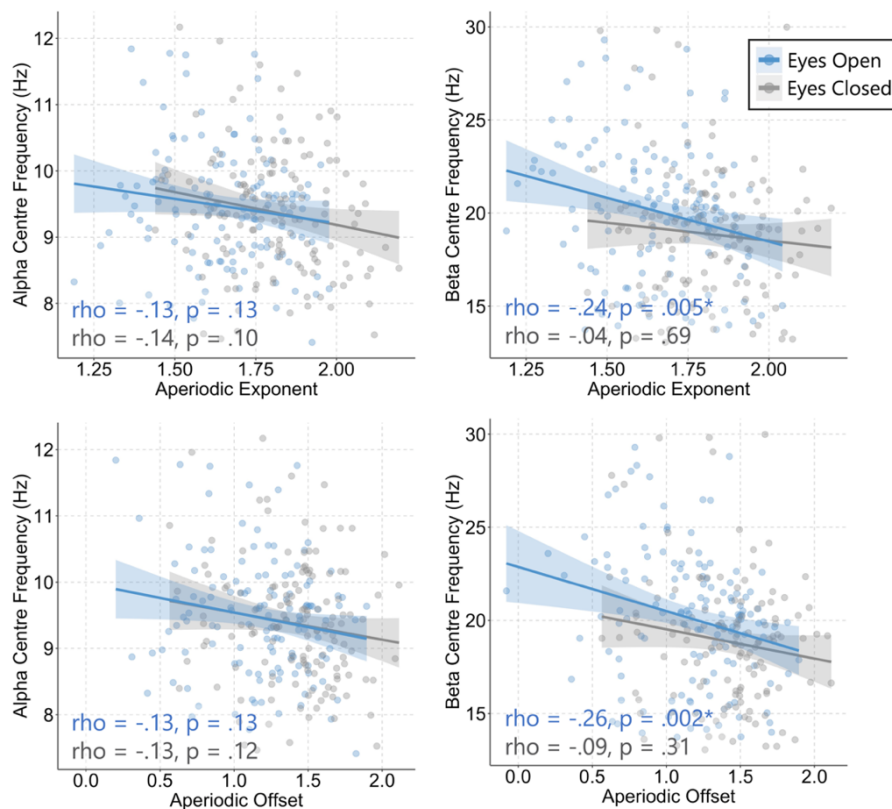


Figure S4: Correlations between alpha and beta centre frequency and aperiodic exponent (upper panel), as well as aperiodic offset (lower panel). Significant associations were found between beta centre frequency and aperiodic exponent and offset for the eyes open conditions only. Asterisk denotes significant result after Bonferroni correction.

Supplemental Table 1: Demographic information

Variable	Descriptive Statistics
Participant Age (Mean \pm SD)	9.41 \pm 1.95
Participant Gender (M/F)	72/67
Participant WASI FSIQ (Mean \pm SD)	110.32 \pm 12.59
Participant Average No. of Siblings	1.36
Primary Caregiver Gender (M/F)	7/122
Primary Caregiver Marital Status	
Unmarried	12
Married	97
Divorced/Separated/Widowed	17
Primary Caregiver Country of Birth	
Australia	86
Asia-Pacific (excl. Aus)	28
Europe	8
North America	2
Other	1
Primary Caregiver Highest Education Level Achieved	
Secondary School	23
Certificate/Diploma/Trade	30
Undergraduate University	43
Postgraduate University	16
Primary Caregiver Employment Status	
Full-time employed	24
Part-time employed	57
Casually employed	21
Unemployed	25
Annual Household Income (AUD)	
<\$20K	2
\$20-40K	14
\$40-60K	7
\$60-80K	11
\$80-100K	9
\$100-120K	15
\$120-140K	16
>\$140K	22

Note: Complete demographic information was unavailable for some participants/caregivers and was thus not included in the table.

EEG Data

Preprocessing: Epoch Rejection

The average percentage of epochs rejected for the eyes open and eyes closed data, respectively was 3.3% (mean trial no. = 32.89, SD = 4.05) and 6.7% (mean trial no. = 32.29, SD = 5.95). The number of trials did not significantly differ between the two groups ($t(138) = -1.17$, $p = 0.245$).

Association between participant age and number of EEG trials

Spearman correlations did not show any association between age and number of trials, for either the eyes open ($\rho = 0.037$, $p = 0.665$), or eyes closed ($\rho = 0.017$, $p = 0.842$) conditions.

Goodness-of-fit of the FOOOF model and age

There was no association between R^2 and age for either the eyes open ($\rho = -0.134$, $p = 0.115$), or eyes closed ($\rho = -0.050$, $p = 0.559$) conditions; nor was there an association between Error and age (eyes open: $\rho = -0.010$, $p = 0.907$; eyes closed: $\rho = 0.017$, $p = 0.844$). There was, however, a weak association between R^2 and epoch number for the eyes open condition ($\rho = 0.232$, $p = 0.006$), as well as for the eyes closed condition ($\rho = 0.177$, $p = 0.037$), however the latter was non-significant after correcting for the two conditions. There was also a weak but significant association between Error and epoch number for the eyes open condition ($\rho = -0.255$, $p = 0.002$), and the eyes closed condition ($\rho = -0.221$, $p = 0.009$).

Reference

Bailey, N. W., Biabani, M., Hill, A. T., Rogasch, N. C., McQueen, B., & Fitzgerald, P. B. (2021). Introducing RELAX (the Reduction of Electrophysiological Artifacts): A fully automatic pre-processing pipeline for EEG data. *In Preparation*.