1.Model fit metrics

Table S1. Variance explained (R squared) and mean absolute error (MAE) differences between original and modified versions of FOOOF per age group.

	Modified version		Original version		Comparison between versions (Modified vs Original)				
					T values		Degrees of freedom	P values	
Age	Error	R^2	Error	R^2	Error	R^2		Error	R^2
42 months	0.09	0.91	0.10	0.89	-1.93	1.11	138	0.05	0.26
96 months	0.07	0.96	0.08	0.95	-3.28	2.80	142	<0.01	<0.01
12 years	0.03	0.98	0.04	0.97	-4.51	1.50	146	<0.01	0.13
16 years	0.03	0.97	0.04	0.96	-4.91	1.20	119	<0.01	0.23

2.Spectrum plots

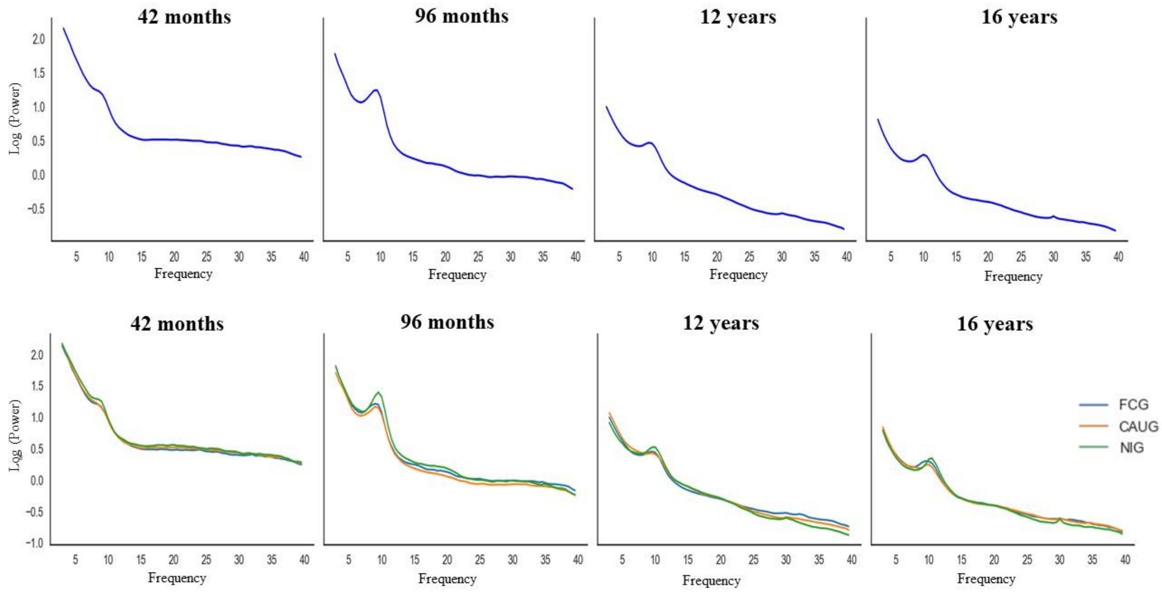

Figure S1. Spectrum plots per age (top) and group (bottom).

3. Normality

Table S2. Skewness and kurtosis of aperiodic exponent and aperiodic offset at every age group.

	Skewness	Kurtosis
Aperiodic exponent		
42 months	-0.17	2.61
96 months	-0.33	2.56
12 years	-0.77	3.94
16 years	-0.62	3.52
Aperiodic offset		
42 months	-0.30	3.17
96 months	-0.27	2.62
12 years	-0.74	3.93
16 years	-0.66	3.50

4. Correlations

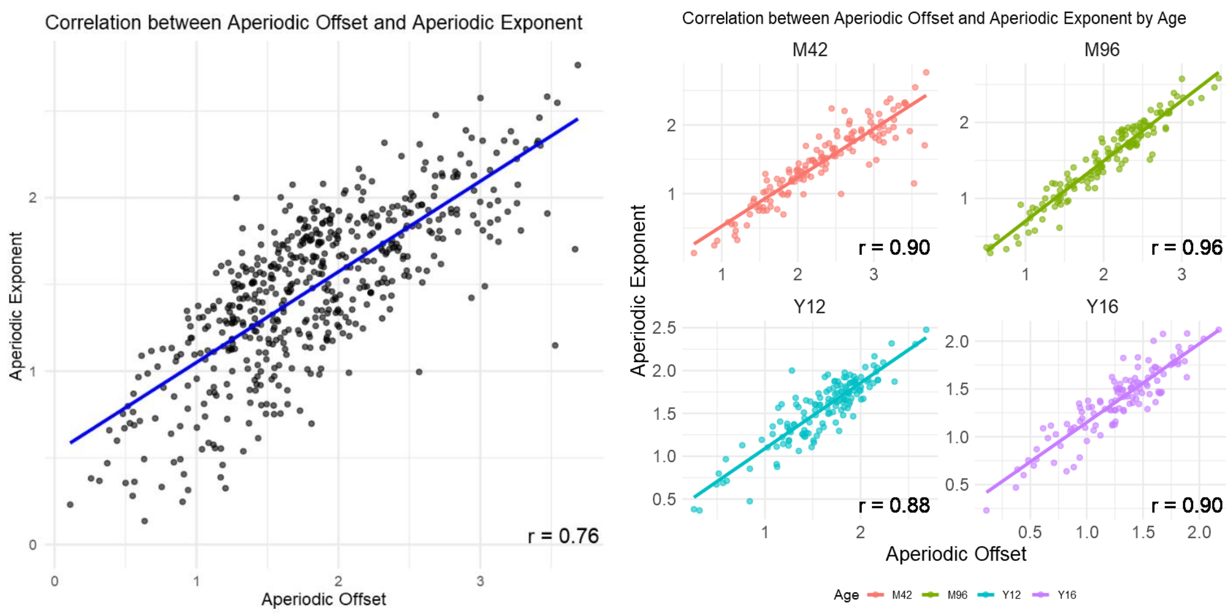

Figure S2. Correlations between aperiodic offset and aperiodic exponent within and across age groups.

5.Model fit for the conditional models

Table S3. Model fit parameters for the latent basis conditional models of the main analyses.

Model	RMSEA (90% CI)	CFI	X^2 (df)	p-value (X^2)
Offset – Sex and Institutionalization	0.00 (0.00- 0.11)	1.00	5.78 (7)	0.56
Exponent – Sex and Institutionalization	0.03 (0.00-0.13)	0.97	7.74 (7)	0.35
Offset – Sex and Intervention	0.00 (0.00-0.08)	1.00	4.07 (7)	0.77
Exponent – Sex and Intervention	0.00 (0.00 – 0.06)	1.00	2.96 (7)	0.88

6.Complementary analyses

6.1.*Sex, Caregiving quality and Age of Placement into Foster Care.*

For these conditional models, we included Sex (Female = 1, Male = 0), Age of Placement in foster care (Before 24 months of age = 1, After 25 months of age = 0) and Caregiving Quality in the institutions, using only sample belonging to FCG group (N=45).

For the latent basis model of the aperiodic offset, looking at the intercept, Sex was estimated to be –0.42 ($p=0.34$), Age of Placement was estimated to be 1.40 ($p=0.54$) and Caregiving Quality was estimated to be -0.19 ($p=0.41$). On another hand, looking at the slope, Sex was estimated to be 0.07 ($p=0.65$), Age of Placement was 0.04 ($p=0.55$) and Caregiving Quality was 0.07 ($p=0.37$).

For the latent basis model of the aperiodic exponent, sex was estimated to be -0.07 ($p=0.85$), Age of Placement was estimated to be -0.65 ($p=0.21$) and Caregiving Quality was estimated to be 0.04 ($p=0.88$) for the intercept. On the other hand, for the slope, sex was estimated to be 0.09 ($p=0.48$), while Age of Placement was estimated to be 0.20 ($p=0.24$) and Caregiving Quality was estimated to be -0.00 ($p=0.97$).

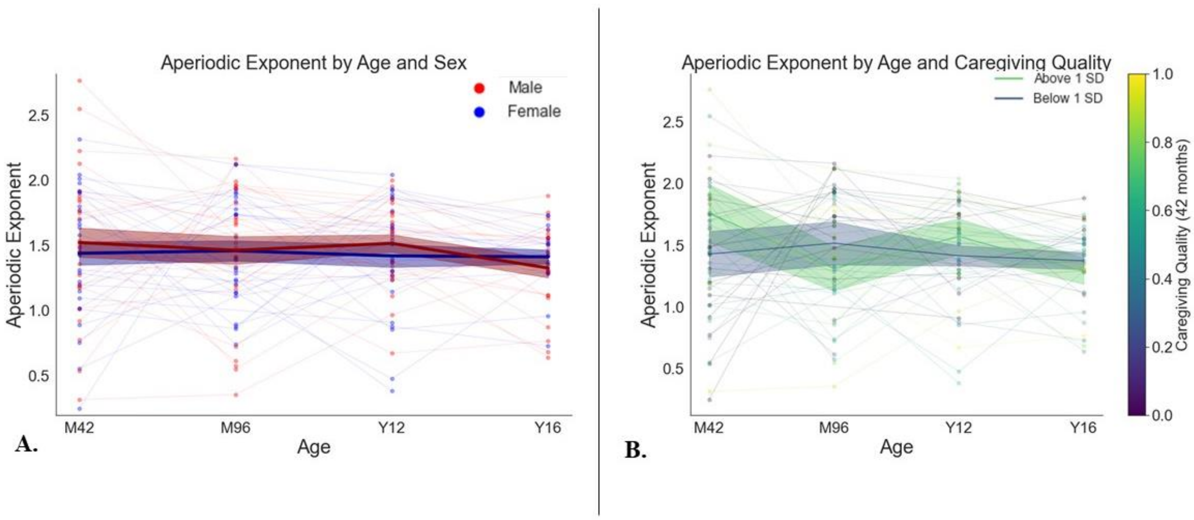

Figure S3. Aperiodic exponent trajectories from 42 months to 16 years of age in the FCG group, divided by Sex (A) and by Caregiving Quality (B).

6.2.Conditional and Unconditional Main Analyses with Eyes Closed

Examining the latent basis model for the aperiodic offset, the mean of the intercept was estimated to be 2.51 with a SE of 0.08 ($p<0.001$) and a variance of 0.02 (SE = 0.03, $p = 0.67$). The mean of the slope was estimated to be -0.40, with a SE of 0.03 ($p < 0.001$), and a variance of 0.01 (SE = 0.01, $p < 0.05$). Therefore, the model indicates that the offset starts with a value different from 0 and then non-linearly decreases as age increases (see Figure S3).

To further explore this estimation of the slope, we conducted pairwise comparisons correcting p values with the Benjamini-Hochberg method. These analyses revealed, that the offset was reduced as age increased, having a significant reduction from 96 months-old to 12 years-old ($t(445)= -0.76$, $p < 0.001$) and from 12 years-old to 16 years-old ($t(445) = -0.45$, $p < 0.001$). No other change between consecutive points was significant ($p > 0.05$). This suggests that the decrease of aperiodic offset across age takes place through the whole age range.

Examining the latent basis model for the aperiodic exponent, the mean of the intercept was estimated to be 1.66 with a SE of 0.08 ($p<0.001$) and a variance of 0.02 (SE = 0.02, $p = 0.42$). The mean of the slope was estimated to be -0.09, with a SE of 0.02 ($p < 0.05$), and a variance of -0.003 (SE = 0.006, $p = 0.58$). Therefore, the model indicates that the exponent starts with a value different from 0 and then non-linearly decreases as age increases (see Figure S3).

Further exploring the slope by conducting pairwise comparisons, the aperiodic exponent had an increase from 42 months-old to 96 months-old ($t(485) = 0.26$, $p<0.001$), and a decrease from 96 months-old to 12 years-old ($t(445) = 0.18$, $p<0.01$) and from 12 years-old to 16 years-old ($t(485) = -0.28$, $p<0.001$), not being significantly different on other consecutive time points ($p > 0.05$). This suggests that aperiodic exponent starts changing at 96 months-old by increasing, and then decreases during adolescence, following an inverted U shape trajectory.

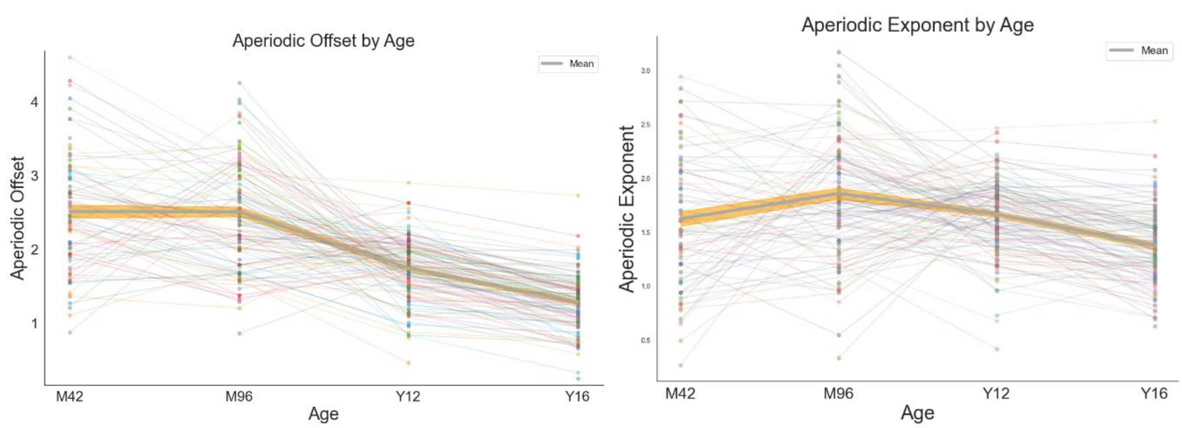

Figure S4. Aperiodic exponent trajectories from 42 months to 16 years of age for the eyes-closed/lights-off.

When exploring the conditional models, we first included how Sex (Female = 1, Male = 0) and Institutionalization (EIG = 1, NIG = 0) directly associated with the latent variables (Intercept and Slope). Looking at the latent basis model for the aperiodic offset, for the intercept, the coefficient for Sex was estimated to be 0.18 ($p < 0.01$) and Institutionalization was estimated to be -0.04 ($p = 0.59$), indicating that females had a more positive value in the intercept. On the other hand, for the slope, the coefficient for sex was estimated to be -0.06 ($p < 0.05$) and the coefficient for Institutionalization was estimated to be 0.01 ($p = 0.58$), meaning that Females had a flatter slope, compared to males. However, further exploring the effect of sex for the slope, pairwise comparisons revealed no significant differences in aperiodic offset values between males and females at any time point (all $p > 0.05$).

On the other hand, looking at the latent basis model for the aperiodic exponent, we explored the influences of Sex and Institutionalization on the latent variables of Intercept and Slope. For the intercept, Sex was estimated to be 0.08 (p=0.06) and Institutionalization was -0.03 (p=0.42). For the slope, the coefficients for Sex and Institutionalization were estimated to be -0.02 (p=0.08) and 0.001 (p=0.99) respectively.

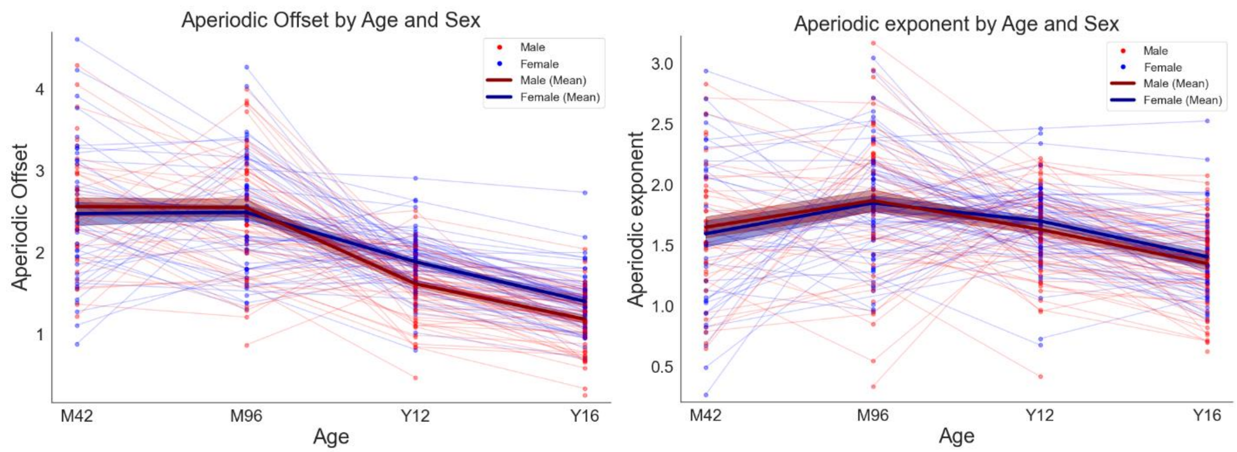

Figure S5. Aperiodic activity trajectories from 42 months to 16 years of age for the eyes-closed/lights-off, divided by sex.

For the second conditional models, we included Sex (Female = 1, Male = 0) and Intervention (FCG = 1, CAUG = 0). For the latent basis model of the aperiodic offset, Sex was estimated to be 0.13 ($p = 0.10$) and Intervention was estimated to be 0.08 ($p = 0.13$) for the intercept. On the other hand, Sex was estimated to be -0.04 ($p = 0.22$) for the slope, while Intervention was estimated to be -0.04 ($p = 0.08$) for the slope. For the latent basis model of the aperiodic exponent, Sex was estimated to be 0.04 ($p = 0.27$) and Intervention was -0.003 ($p = 0.91$) for the intercept. For the slope, Sex was estimated to be -0.01 ($p = 0.25$) and Intervention was estimated to be -0.01 ($p = 0.45$).

6.3. Conditional and Unconditional Main Analyses with Frontal Electrodes

We included the analyses on frontal electrodes (F3, Fz, F4). Examining the latent basis model for the aperiodic offset, the mean of the intercept was estimated to be 2.59 with a SE of 0.06 ($p < 0.001$) and a variance of -0.03 (SE = 0.05, $p = 0.51$). The mean of the slope was estimated to be -0.27, with a SE of 0.02 ($p < 0.001$), and a variance of 0.01 (SE = 0.01, $p = 0.25$). Therefore, the model indicates that the offset starts with a value different from 0 and then non-linearly decreases as age increases (see Figure S5). To further explore this estimation of the slope, we conducted pairwise comparisons correcting p values with the Benjamini-Hochberg method. These analyses revealed, that the offset was reduced as age increased, having a significant reduction from 42 months-old to 96 months-old ($t(481) = -0.37$, $p < 0.001$), from 96 months-old to 12 years-old ($t(481) = -0.12$, $p < 0.05$) and from 12 years-old to 16 years-old ($t(481) = -0.31$, $p < 0.001$). This suggests that the decrease of aperiodic offset across age takes place through the whole range.

For the model for the aperiodic exponent, the mean of the intercept was estimated to be 1.76 with a SE of 0.02 ($p<0.001$) and a variance of 0.02 (SE = 0.01, $p = 0.61$). The mean of the slope was estimated to be -0.01, with a SE of 0.01 ($p < 0.05$), and the variance was 0.01 (SE = 0.01, $p = 0.25$). Therefore, the model indicates that the offset starts with a value different from 0 and then non-linearly increases as age increases (see Figure S5). However, further exploring the slope by conducting pairwise comparisons, the aperiodic exponent had an increase from 96 months-old to 12 years-old ($t(481) = 0.17$, $p<0.01$), and a decrease from 12 years-old to 16 years-old ($t(481) = -0.13$, $p<0.05$), not being significantly different on other consecutive time points ($p > 0.05$). This suggests that aperiodic exponent starts changing at 12-years-old by increasing, and then decreases later at 16 years-old, following an inverted U shape trajectory.

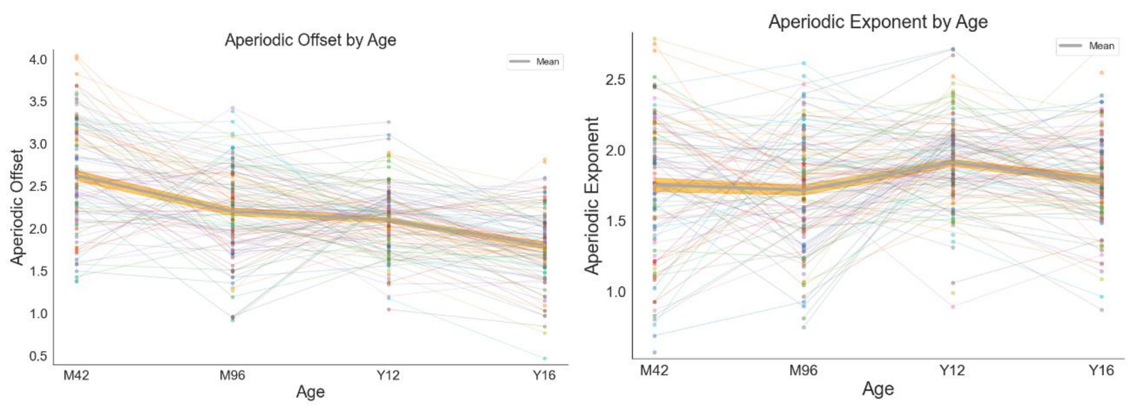

Figure S6. Aperiodic activity trajectories from 42 months to 16 years of age for the frontal electrodes.

When exploring the conditional models, we first included how Sex (Female = 1, Male = 0) and Institutionalization (EIG = 1, NIG = 0) directly associated with the latent variables (Intercept and Slope). Looking at the latent basis model for the aperiodic offset, for the intercept, the coefficient for Sex was estimated to be 0.09 ($p=0.12$) and Institutionalization was estimated to be -0.03 ($p=0.66$). On the other hand, for the slope, the coefficient for sex was estimated to be -0.03 ($p=0.70$) and the coefficient for Institutionalization was estimated to be 0.01 ($p=0.84$).

On the other hand, looking at the latent basis model for the aperiodic exponent, we explored the influences of Sex and Institutionalization on the latent variables of Intercept and Slope. For the intercept, Sex was estimated to be 0.01 ($p=0.25$) and Institutionalization was -0.04

($p=0.77$). For the slope, the coefficients for Sex and Institutionalization were estimated to be -0.001 ($p=0.64$) and -0.001 ($p=0.59$) respectively.

For the second conditional models, we included Sex (Female = 1, Male = 0) and Intervention (FCG = 1, CAUG = 0). For the latent basis model of the aperiodic offset, Sex was estimated to be 0.02 ($p=0.80$) and Intervention was estimated to be -0.01 ($p=0.91$) for the intercept. On the other hand, Sex was estimated to be -0.02 for the slope ($p=0.69$), while Intervention was estimated to be 0.01 ($p=0.75$). For the latent basis model of the aperiodic exponent, Sex was estimated to be -0.02 for the intercept ($p=0.64$) and Intervention was -0.01 ($p=0.75$). For the slope, Sex was estimated to be 0.001 ($p=0.77$) and Intervention was estimated to be 0.001 ($p=0.16$).