**Table 1**. Sample demographics of typically developing youth from three separate cohorts collected utilizing cohort-sequential longitudinal designs at three separate sites in independent research projects. PIT: *Pittsburgh*, USA; NCD: *NeuroCognitive Development*, Norway; OADS: *Orygen Adolescent Development Study*; Australia. Values represent Means and (standard deviations) unless otherwise noted.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **PIT** | | | | **NCD** | | | **OADS** | | |
|  | All | Female | | Male | All | Female | Male | All | Female | Male |
| N | 73 | 41 | | 32 | 76 | 37 | 39 | 67 | 32 | 49 |
| Age (years) | 12.3 (.9) | 11.9 (.7) | | 12.9 (.7)\* | 15.2 (3.6) | 15.1 (3.5) | 15.4 (3.7) | 16.2 (2.6) | 16.3 (2.5) | 16.1 (2.6) |
| Age Range (years) | 10.1-16.2 | | 10.1-15.9 | 11.4-16.2 | 8.2-21.9 | 8.4-  21.8 | 8.2-21.9 | 11.5-20.3 | 12.1-19.7 | 11.5-20.3 |
| Total Scans (N) | 146 | 82 | | 64 | 152 | 74 | 78 | 169 | 81 | 88 |
| Participants with 2 Scans (N) | 73 | 41 | | 32 | 76 | 37 | 39 | 32 | 15 | 17 |
| Participants with 3 Scans (N) | -- | -- | | -- | -- | -- | -- | 35 | 17 | 18 |
| Scan Interval | 2.2 (.4) | 2.2 (.4) | | 2.1 (.4) | 2.6 (.2) | 2.7 (.2) | 2.6 (.2) | 3.09 (.9) | 3.09 (.9) | 3.19 (.8) |

\* Age difference between sexes by design (see Supplementary Material for details).

**Table 2.** GAMM estimates for age, sex, and age\*sex for each brain region across all three samples (sample and sample\*age included as covariates). Smooth function (edf) as well as degrees of freedom (Ref.df) and F-statistic and associated p-value for age (***Bold*** highlights p<.05). Note, sex was coded as a factor (male=0, female=1), allowing for each term to reflect the following: sex term reflected the difference in intercept in females as compared to males; age term reflected the slope of age for males; age\*sex term reflected the difference in slope of females as compared to males.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **THALAMUS** | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** |
| Sex (Females) | -755.52 | 91.63 | -8.25 | **0.00000** |
| **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 2.39 | 3 | 4.59 | **0.00032** |
| s(age):Females | 1.34 | 3 | 3.93 | **0.00037** |
| **PALLIDUM** | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** |
| Sex (Females) | -158.71 | 27.54 | -5.76 | **0.00000** |
| **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 1.75 | 3 | 1.44 | 0.05730 |
| s(age):Females | 1.33 | 3 | 2.44 | **0.00541** |
| **CAUDATE** | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** |
| Sex (Females) | -201.10 | 67.56 | -2.98 | **0.00307** |
| **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 0.00 | 3 | 0.00 | 0.49710 |
| s(age):Females | 1.60 | 3 | 7.04 | **0.00000** |
| **PUTAMEN** | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** |
| Sex (Females) | -540.36 | 81.98 | -6.59 | **0.00000** |
| **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 1.77 | 3 | 5.49 | **0.00002** |
| s(age):Females | 1.61 | 3 | 5.63 | **0.00002** |
| **NUCLEUS ACCUMBENS** | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** |
| Sex (Females) | -48.13 | 11.93 | -4.03 | **0.00006** |
| **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 0.00 | 3 | 0.00 | 0.79800 |
| s(age):Females | 2.32 | 3 | 12.30 | **0.00000** |
| **HIPPOCAMPUS** | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** |
| Sex (Females) | -360.75 | 51.63 | -6.99 | **0.00000** |
| **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 2.31 | 3 | 5.52 | **0.00004** |
| s(age):Females | 1.63 | 3 | 4.65 | **0.00018** |
| **AMYGDALA** | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** |
| Sex (Females) | -168.52 | 22.60 | -7.46 | **0.00000** |
| **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 2.49 | 3 | 18.28 | **0.00000** |
| s(age):Females | 0.99 | 3. | 1.34 | **0.02790** |

**Table 3.**  GAMM estimates for age for each brain region across all three samples (sample and sample\*age included as covariates) in females and males separately. Smooth function (edf) as well as degrees of freedom (Ref.df) and F-statistic and associated p-value (***bold*** highlights p<.05) for each term.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **THALAMUS** | | | | | | | | | |
| **FEMALES** | | | | | **MALES** | | | | |
|  | **edf** | **Ref.df** | **F** | **p-value** |  | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 0.39 | 3 | 0.20 | 0.20280 | s(age) | 2.55 | 3 | 5.73 | **0.00006** |
| **PALLIDUM** | | | | | | | | | |
| **FEMALES** | | | | | **MALES** | | | | |
|  | **edf** | **Ref.df** | **F** | **p-value** |  | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 0.00 | 3 | 0.00 | 0.31159 | s(age) | 1.49 | 3 | 0.95 | 0.12040 |
| **CAUDATE** | | | | | | | | | |
| **FEMALES** | | | | | **MALES** | | | | |
|  | **edf** | **Ref.df** | **F** | **p-value** |  | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 1.87 | 3 | 9.46 | **<0.00001** | s(age) | 0.00 | 3 | 0.00 | 1.00000 |
| **PUTAMEN** | | | | | | | | | |
| **FEMALES** | | | | | **MALES** | | | | |
|  | **edf** | **Ref.df** | **F** | **p-value** |  | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 2.65 | 3 | 70.73 | **<0.00001** | s(age) | 0.30 | 3 | 0.13 | 0.16500 |
| **NUCLEUS ACCUMBENS** | | | | | | | | | |
| **FEMALES** | | | | | **MALES** | | | | |
|  | **edf** | **Ref.df** | **F** | **p-value** |  | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 1.21 | 3 | 1.42 | **0.02650** | s(age) | 0.00 | 3 | 0.00 | 0.82200 |
| **HIPPOCAMPUS** | | | | | | | | | |
| **FEMALES** | | | | | **MALES** | | | | |
|  | **edf** | **Ref.df** | **F** | **p-value** |  | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 2.57 | 3 | 7.64 | **0.00001** | s(age) | 1.92 | 3 | 2.54 | **0.00995** |
| **AMYGDALA** | | | | | | | | | |
| **FEMALES** | | | | | **MALES** | | | | |
|  | **edf** | **Ref.df** | **F** | **p-value** |  | **edf** | **Ref.df** | **F** | **p-value** |
| s(age) | 2.54 | 3 | 10.30 | **<0.00001** | s(age) | 2.03 | 3 | 7.08 | **<0.00001** |

**Table 4.** GAMM smooth function estimates to test sample differences in age trajectories. Smooth function (edf) as well as degrees of freedom (Ref.df) and F-statistic and associated p-value (***bold*** highlights p<.05) for each term.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **THALAMUS** | | | | | | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** | **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| NCD vs. ADS | -153.12 | 112.56 | -1.36 | 0.17400 | s(age):NCD vs. ADS | 2.02 | 3 | 3.02 | **0.00386** |
| PIT vs. ADS | -22.48 | 114.23 | -0.20 | 0.84400 | s(age):PIT vs. ADS | 0.00 | 3 | 0.00 | 0.33695 |
| PIT vs. NCD | 98.24 | 111.27 | 0.88 | 0.37800 | s(age):PIT vs. NCD | 0.00 | 3 | 0.00 | 1.00000 |
| **PALLIDUM** | | | | | | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** | **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| NCD vs. ADS | 145.08 | 34.00 | 4.28 | **0.00002** | s(age):NCD vs. ADS | 2.04 | 3 | 14.67 | **<0.00001** |
| PIT vs. ADS | 171.93 | 37.21 | 4.62 | **<0.00001** | s(age):PIT vs. ADS | 1.22 | 3 | 4.06 | **0.00549** |
| PIT vs. NCD | 35.77 | 35.90 | 1.00 | 0.32000 | s(age):PIT vs. NCD | 1.20 | 3 | 2.52 | **0.00344** |
| **CAUDATE** | | | | | | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** | **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| NCD vs. ADS | -27.89 | 83.05 | -0.34 | 0.73719 | s(age):NCD vs. ADS | 1.90 | 3 | 3.13 | **0.00231** |
| PIT vs. ADS | -192.55 | 86.43 | -2.23 | **0.02637** | s(age):PIT vs. ADS | 1.36 | 3 | 5.63 | **0.00001** |
| PIT vs. NCD | -187.54 | 81.67 | -2.30 | **0.02212** | s(age):PIT vs. NCD | 0.00 | 3 | 0.00 | 0.39590 |
| **PUTAMEN** | | | | | | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** | **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| NCD vs. ADS | -276.40 | 100.83 | -2.74 | **0.00636** | s(age):NCD vs. ADS | 0.00 | 3 | 0.00 | 0.52600 |
| PIT vs. ADS | -213.92 | 102.47 | -2.09 | **0.03738** | s(age):PIT vs. ADS | 0.23 | 3 | 0.10 | 0.24500 |
| PIT vs. NCD | 72.37 | 99.37 | 0.73 | 0.46684 | s(age):PIT vs. NCD | 0.00 | 3 | 0.00 | 0.88537 |
| **NUCLEUS ACCUMBENS** | | | | | | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** | **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| NCD vs. ADS | 93.96 | 14.65 | 6.41 | **<0.00001** | s(age):NCD vs. ADS | 0.00 | 3 | 0.00 | 0.47700 |
| PIT vs. ADS | 30.98 | 14.95 | 2.07 | **0.03870** | s(age):PIT vs. ADS | 0.00 | 3 | 0.00 | 0.88200 |
| PIT vs. NCD | -62.98 | 14.46 | -4.36 | **0.00002** | s(age):PIT vs. NCD | 0.00 | 3 | 0.00 | 0.88200 |
| **HIPPOCAMPUS** | | | | | | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** | **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| NCD vs. ADS | -159.38 | 63.65 | -2.50 | **0.01263** | s(age):NCD vs. ADS | 0.00 | 3 | 0.00 | 0.40813 |
| PIT vs. ADS | -196.22 | 66.05 | -2.97 | **0.00313** | s(age):PIT vs. ADS | 1.10 | 3 | 2.35 | **0.00613** |
| PIT vs. NCD | -27.32 | 63.21 | -0.43 | 0.66580 | s(age):PIT vs. NCD | 0.53 | 3 | 0.33 | 0.14677 |
| **AMYGDALA** | | | | | | | | | |
| **Intercept** | **Estimate** | **SE** | **t-value** | **p-value** | **Slope** | **edf** | **Ref.df** | **F** | **p-value** |
| NCD vs. ADS | -51.45 | 27.83 | -1.85 | 0.06520 | s(age):NCD vs. ADS | 0.00 | 3 | 0.00 | 0.63460 |
| PIT vs. ADS | 16.02 | 28.89 | 0.56 | 0.57940 | s(age):PIT vs. ADS | 0.51 | 3 | 0.36 | 0.13960 |
| PIT vs. NCD | 67.47 | 28.21 | 2.39 | **0.01720** | s(age):PIT vs. NCD | 0.51 | 3 | 0.36 | 0.13960 |

**Table 5.** LME best fit models for each brain region by sex and sample. Highest-order best fit polynomial model summary reported. Test refers to the highest-order model compared to previous sequential model tested (1 = null model, 2 = linear, 3 = quadratic, 4= cubic) and its associated Likelihood Ratio (L.Ratio) and p-value (***bold*** highlights p<.05).

