ResultsSect

Freya Acar

Descriptives

Participants

Thirty CW (mean age = 25.80 years, SD = 3.84), 30 CM (mean age = 26.03 years, SD = 5.26), 40 TM (mean age = 24.38 years, SD = 5.35), and 41 TW (mean age = 24.88 years, SD = 6.20) participated in the study. One TW participant was excluded because no results could be extracted from FreeSurfer. Demographics can be observed in Table 1. The sample did not differ significantly in age [F(3, 136) = 0.74, p = 0.528].

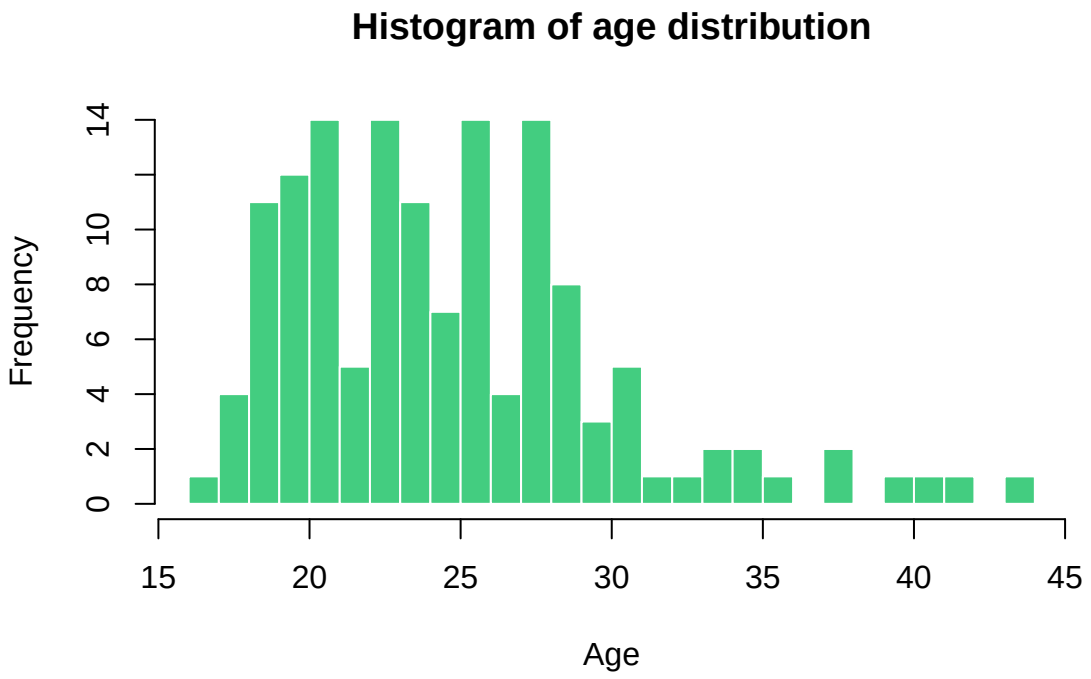
Table with demographic information

Table 1: Demographics

Group	CW	CM	TM	TW
Age	25.8 ± 3.84	26.03 ± 5.26	24.38 ± 5.35	24.88 ± 6.2
SES	2.3 ± 0.47	2.23 ± 0.57	2 ± 0.6	1.98 ± 0.7
Education	3.57 ± 0.9	3.43 ± 0.82	3.15 ± 0.74	2.95 ± 0.81
Handedness	1.13 ± 0.35	1.07 ± 0.25	1.07 ± 0.27	1.05 ± 0.22

Code for demographics

The code can be found in markdown version of this file, it is not printed in the PDF



Results

Repeated measures

Questions: do we want (to account for) a correlation between regions of the same participant?

First we look at the results for volume. Alle code used to compute this can be found in the markdown version of this document, but is not printed in the pdf.
We fitted two mixed models. In both models a random intercept for every subject was added, in the second model age and total intracranial volume are added as covariates. An ANOVA is conducted on the results of the mixed models and an FDR-correction is applied over regions. For the regions where a statistically significant difference was found between the groups post-hoc paired comparisons were conducted that are bonferroni-corrected. The results for both models are very similar. A summary of the results is displayed in the tables below. All code used to obtain these results can be found in the RmD file.
If no statistically significant difference is found for a regions "NA" is printed for that region.

Table 2: ANOVA for volume with FDR correction for model with and without covariates

region	No cov	With cov
L_fusiform_volume	0	0
L_inferiorparietal_volume	0	0
L_postcentral_volume	0.001	0
L_precentral_volume	0.012	0.008
L_frontalpole_volume	0.008	0.007
R_fusiform_volume	0	0
R_inferiorparietal_volume	0	0
R_postcentral_volume	0.01	0.007
R_precentral_volume	0.001	0.001
R_frontalpole_volume	0.002	0.002
LeftCerebellumWhiteMatter	0.001	0.001
LeftCerebellumCortex	0	0
RightCerebellumWhiteMatter	0.001	0.001
RightCerebellumCortex	0	0
LeftThalamusProper	0	0
LeftCaudate	0.003	0.002
LeftPutamen	0.006	0.004
LeftAccumbensarea	0.542	0.547
RightThalamusProper	0	0
RightCaudate	0.002	0.001
RightPutamen	0	0
RightAccumbensarea	0.121	0.115

Table 3: Group-wise comparison for volume in model with no covariates

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_volume	0.04	0.061	1	0	0.608	0
L_inferiorparietal_volume	0.108	0.076	1	0	1	0.006
L_postcentral_volume	0.007	1	0.357	0.001	1	0.067
L_precentral_volume	0.263	1	0.963	0.026	1	0.115
L_frontalpole_volume	1	1	0.023	1	0.814	0.005
R_fusiform_volume	0.015	0.02	1	0	0.891	0.004
R_inferiorparietal_volume	0.238	0.289	0.786	0	1	0.001

R_postcentral_volume	0.965	1	0.597	0.042	1	0.013
R_precentral_volume	0.017	1	0.013	0.019	1	0.022
R_frontalpole_volume	0.054	1	1	0.001	0.22	0.433
LeftCerebellumWhiteMatter	0.018	1	1	0.001	0.009	0.754
LeftCerebellumCortex	0.004	0.41	0.006	0	1	0
RightCerebellumWhiteMatter	0.018	1	1	0	0.056	0.258
RightCerebellumCortex	0.002	0.184	0.046	0	1	0
LeftThalamusProper	0.005	0.065	1	0	0.056	0.002
LeftCaudate	0.028	1	0.072	0.025	1	0.065
LeftPutamen	0.071	1	0.211	0.032	1	0.11
LeftAccumbensarea	NA	NA	NA	NA	NA	NA
RightThalamusProper	0.143	0.033	1	0	0.455	0.004
RightCaudate	0.004	1	0.162	0.005	1	0.149
RightPutamen	0	1	0.001	0.001	1	0.015
RightAccumbensarea	NA	NA	NA	NA	NA	NA

Table 4: Group-wise comparison for volume in model with covariates

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_volume	0.883	0.049	1	0	1	0.001
L_inferiorparietal_volume	1	0.054	1	0	1	0.015
L_postcentral_volume	1	1	1	0.01	1	0.233
L_precentral_volume	1	1	1	0.324	1	0.184
L_frontalpole_volume	1	1	0.156	1	0.269	0.019
R_fusiform_volume	0.533	0.02	1	0	0.718	0.008
R_inferiorparietal_volume	1	0.198	1	0.005	1	0.002
R_postcentral_volume	1	1	1	0.322	1	0.046
R_precentral_volume	1	1	0.047	0.221	1	0.024
R_frontalpole_volume	0.381	1	1	0.002	0.286	0.701
LeftCerebellumWhiteMatter	1	1	1	0.006	0.103	1
LeftCerebellumCortex	0.149	0.446	0.012	0	1	0
RightCerebellumWhiteMatter	1	0.879	1	0.006	0.365	0.484
RightCerebellumCortex	0.086	0.203	0.071	0	1	0
LeftThalamusProper	1	0.078	1	0	1	0.004
LeftCaudate	1	1	0.236	0.074	1	0.145
LeftPutamen	1	1	0.588	0.693	1	0.157
LeftAccumbensarea	NA	NA	NA	NA	NA	NA
RightThalamusProper	1	0.032	1	0.008	1	0.012
RightCaudate	0.87	1	0.474	0.029	1	0.277
RightPutamen	0.451	1	0.005	0.065	1	0.02
RightAccumbensarea	NA	NA	NA	NA	NA	NA

Then we do the same computations for thickness. However, for thickness we leave out intracranial volume as a covariate (cf. e-mail Meredith Braskie).

Table 5: ANOVA for thickness with FDR correction for model with and without covariates

region	No cov	With cov
L_fusiform_thickavg	0.683	0.68
R_fusiform_thickavg	0.661	0.612
L_inferiorparietal_thickavg	0.661	0.612

R_inferiorparietal_thickavg	0.661	0.612
L_postcentral_thickavg	0.683	0.68
R_postcentral_thickavg	0.753	0.74
L_precentral_thickavg	0.661	0.612
R_precentral_thickavg	0.661	0.612
L_frontalpole_thickavg	0.661	0.612
R_frontalpole_thickavg	0.661	0.612

Table 6: Group-wise comparison for thickness in model with no covariates

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_thickavg	NA	NA	NA	NA	NA	NA
R_fusiform_thickavg	NA	NA	NA	NA	NA	NA
L_inferiorparietal_thickavg	NA	NA	NA	NA	NA	NA
R_inferiorparietal_thickavg	NA	NA	NA	NA	NA	NA
L_postcentral_thickavg	NA	NA	NA	NA	NA	NA
R_postcentral_thickavg	NA	NA	NA	NA	NA	NA
L_precentral_thickavg	NA	NA	NA	NA	NA	NA
R_precentral_thickavg	NA	NA	NA	NA	NA	NA
L_frontalpole_thickavg	NA	NA	NA	NA	NA	NA
R_frontalpole_thickavg	NA	NA	NA	NA	NA	NA

Table 7: Group-wise comparison for thickness in model with covariates

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_thickavg	NA	NA	NA	NA	NA	NA
R_fusiform_thickavg	NA	NA	NA	NA	NA	NA
L_inferiorparietal_thickavg	NA	NA	NA	NA	NA	NA
R_inferiorparietal_thickavg	NA	NA	NA	NA	NA	NA
L_postcentral_thickavg	NA	NA	NA	NA	NA	NA
R_postcentral_thickavg	NA	NA	NA	NA	NA	NA
L_precentral_thickavg	NA	NA	NA	NA	NA	NA
R_precentral_thickavg	NA	NA	NA	NA	NA	NA
L_frontalpole_thickavg	NA	NA	NA	NA	NA	NA
R_frontalpole_thickavg	NA	NA	NA	NA	NA	NA

And surface area:

Table 8: ANOVA for surface area with FDR correction for model with and without covariates

region	No cov	With cov
L_fusiform_surfavg	0.004	0
R_fusiform_surfavg	0.014	0.001
L_inferiorparietal_surfavg	0.001	0
R_inferiorparietal_surfavg	0.003	0
L_postcentral_surfavg	0.019	0.001
R_postcentral_surfavg	0.082	0.012
L_precentral_surfavg	0.012	0.001

R_precentral_surfavg	0.002	0
L_frontalpole_surfavg	0.612	0.539
R_frontalpole_surfavg	0.001	0

Table 9: Group-wise comparison for surface area in model with no covariates

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_surfavg	0.034	1	1	0.001	0.08	1
R_fusiform_surfavg	0.065	1	1	0.003	0.543	0.896
L_inferiorparietal_surfavg	0.009	1	1	0	0.174	0.175
R_inferiorparietal_surfavg	0.009	1	1	0.001	0.227	0.545
L_postcentral_surfavg	0.004	1	1	0.203	0.159	1
R_postcentral_surfavg	NA	NA	NA	NA	NA	NA
L_precentral_surfavg	0.016	1	0.365	0.02	1	0.444
R_precentral_surfavg	0	0.418	0.128	0.05	0.314	1
L_frontalpole_surfavg	NA	NA	NA	NA	NA	NA
R_frontalpole_surfavg	0.004	1	1	0.001	0.003	1

Table 10: Group-wise comparison for surface area in model with covariates

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_surfavg	1	0.68	1	0.154	0.876	1
R_fusiform_surfavg	1	0.205	1	0.254	1	1
L_inferiorparietal_surfavg	1	0.513	1	0.016	1	0.218
R_inferiorparietal_surfavg	1	1	1	0.044	1	0.842
L_postcentral_surfavg	1	1	1	1	1	1
R_postcentral_surfavg	1	1	1	1	1	1
L_precentral_surfavg	1	1	1	0.666	1	0.87
R_precentral_surfavg	0.541	0.447	0.466	1	1	1
L_frontalpole_surfavg	NA	NA	NA	NA	NA	NA
R_frontalpole_surfavg	0.417	1	1	0.051	0.037	1

Compare to results from 1 timepoint

In this section we explore what the results would have been if we would have been limited to one scan for the analysis. Tables 11, 14 and 17 show the p-values resulting from the anova's conducted on T1, T2 and both respectively. You can observe the (slight) increase in power here.

Volume

Table 11: Comparison volume

Region	T1	T2	Rep Meas
L_fusiform_volume	0	0	0
L_inferiorparietal_volume	0.001	0	0
L_postcentral_volume	0.002	0.001	0.001
L_precentral_volume	0.032	0.007	0.012
L_frontalpole_volume	0.006	0.045	0.008
R_fusiform_volume	0	0	0
R_inferiorparietal_volume	0.001	0	0
R_postcentral_volume	0.014	0.011	0.01
R_precentral_volume	0.002	0.001	0.001
R_frontalpole_volume	0.001	0.009	0.002
LeftCerebellumWhiteMatter	0.001	0.001	0.001
LeftCerebellumCortex	0	0	0
RightCerebellumWhiteMatter	0.001	0	0.001
RightCerebellumCortex	0	0	0
LeftThalamusProper	0	0	0
LeftCaudate	0.002	0.005	0.003
LeftPutamen	0.006	0.013	0.006
LeftAccumbensarea	0.453	0.249	0.542
RightThalamusProper	0	0	0
RightCaudate	0.002	0.002	0.002
RightPutamen	0	0	0
RightAccumbensarea	0.119	0.169	0.121

Table 12: Volume: T1

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_volume	0.014	0.047	1	0	0.202	0.001
L_inferiorparietal_volume	0.137	0.158	1	0	0.949	0.025
L_postcentral_volume	0.01	1	0.233	0.002	1	0.06
L_precentral_volume	0.284	1	0.807	0.087	1	0.243
L_frontalpole_volume	0.929	1	0.015	0.998	1	0.009
R_fusiform_volume	0.013	0.02	1	0	0.78	0.006
R_inferiorparietal_volume	0.162	0.568	1	0.001	1	0.006
R_postcentral_volume	0.87	1	0.534	0.067	1	0.018
R_precentral_volume	0.014	1	0.026	0.034	1	0.087
R_frontalpole_volume	0.004	1	0.624	0.005	0.177	0.724
LeftCerebellumWhiteMatter	0.036	0.775	1	0	0.01	0.677
LeftCerebellumCortex	0.005	0.587	0.009	0	1	0
RightCerebellumWhiteMatter	0.04	1	1	0.001	0.133	0.221
RightCerebellumCortex	0.003	0.227	0.058	0	1	0
LeftThalamusProper	0.004	0.196	0.61	0	0.174	0.002

LeftCaudate	0.021	1	0.072	0.02	1	0.066
LeftPutamen	0.14	1	0.417	0.032	1	0.069
LeftAccumbensarea	NA	NA	NA	NA	NA	NA
RightThalamusProper	0.127	0.047	1	0	0.775	0.004
RightCaudate	0.003	1	0.124	0.007	1	0.203
RightPutamen	0	1	0.002	0.001	1	0.03
RightAccumbensarea	NA	NA	NA	NA	NA	NA

Table 13: Volume: T2

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_volume	0.136	0.146	0.831	0	1	0
L_inferiorparietal_volume	0.119	0.075	1	0	1	0.003
L_postcentral_volume	0.007	1	0.393	0.001	0.981	0.088
L_precentral_volume	0.28	1	0.95	0.029	1	0.058
L_frontalpole_volume	1	1	0.169	1	1	0.027
R_fusiform_volume	0.03	0.009	1	0	0.87	0.004
R_inferiorparietal_volume	0.388	0.179	0.632	0.001	1	0
R_postcentral_volume	1	1	0.786	0.051	1	0.012
R_precentral_volume	0.03	1	0.009	0.023	1	0.007
R_frontalpole_volume	1	0.173	1	0.004	0.576	0.439
LeftCerebellumWhiteMatter	0.016	1	1	0	0.009	0.877
LeftCerebellumCortex	0.004	0.456	0.013	0	1	0
RightCerebellumWhiteMatter	0.01	1	1	0	0.024	0.337
RightCerebellumCortex	0.002	0.251	0.061	0	1	0
LeftThalamusProper	0.015	0.022	1	0	0.047	0.004
LeftCaudate	0.043	1	0.055	0.056	1	0.071
LeftPutamen	0.075	1	0.147	0.137	1	0.318
LeftAccumbensarea	NA	NA	NA	NA	NA	NA
RightThalamusProper	0.208	0.018	1	0	0.425	0.007
RightCaudate	0.007	1	0.142	0.005	1	0.118
RightPutamen	0	1	0	0.004	1	0.013
RightAccumbensarea	NA	NA	NA	NA	NA	NA

Thickness

Table 14: Comparison thickness

Region	T1	T2	Rep Meas
L_fusiform_thickavg	0.66	0.86	0.683
R_fusiform_thickavg	0.66	0.746	0.661
L_inferiorparietal_thickavg	0.66	0.746	0.661
R_inferiorparietal_thickavg	0.66	0.746	0.661
L_postcentral_thickavg	0.894	0.746	0.683
R_postcentral_thickavg	0.66	0.86	0.753
L_precentral_thickavg	0.66	0.746	0.661
R_precentral_thickavg	0.66	0.746	0.661
L_frontalpole_thickavg	0.66	0.86	0.661
R_frontalpole_thickavg	0.66	0.746	0.661

Table 15: Thickness: T1

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_thickavg	NA	NA	NA	NA	NA	NA
R_fusiform_thickavg	NA	NA	NA	NA	NA	NA
L_inferiorparietal_thickavg	NA	NA	NA	NA	NA	NA
R_inferiorparietal_thickavg	NA	NA	NA	NA	NA	NA
L_postcentral_thickavg	NA	NA	NA	NA	NA	NA
R_postcentral_thickavg	NA	NA	NA	NA	NA	NA
L_precentral_thickavg	NA	NA	NA	NA	NA	NA
R_precentral_thickavg	NA	NA	NA	NA	NA	NA
L_frontalpole_thickavg	NA	NA	NA	NA	NA	NA
R_frontalpole_thickavg	NA	NA	NA	NA	NA	NA

Table 16: Thickness: T2

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_thickavg	NA	NA	NA	NA	NA	NA
R_fusiform_thickavg	NA	NA	NA	NA	NA	NA
L_inferiorparietal_thickavg	NA	NA	NA	NA	NA	NA
R_inferiorparietal_thickavg	NA	NA	NA	NA	NA	NA
L_postcentral_thickavg	NA	NA	NA	NA	NA	NA
R_postcentral_thickavg	NA	NA	NA	NA	NA	NA
L_precentral_thickavg	NA	NA	NA	NA	NA	NA
R_precentral_thickavg	NA	NA	NA	NA	NA	NA
L_frontalpole_thickavg	NA	NA	NA	NA	NA	NA
R_frontalpole_thickavg	NA	NA	NA	NA	NA	NA

Surface Area

Table 17: Comparison surface area

Region	T1	T2	Rep Meas
L_fusiform_surfavg	0.002	0.01	0.004
R_fusiform_surfavg	0.016	0.014	0.014
L_inferiorparietal_surfavg	0.002	0.001	0.001
R_inferiorparietal_surfavg	0.002	0.004	0.003
L_postcentral_surfavg	0.021	0.019	0.019
R_postcentral_surfavg	0.044	0.167	0.082
L_precentral_surfavg	0.014	0.01	0.012
R_precentral_surfavg	0.002	0.004	0.002
L_frontalpole_surfavg	0.323	0.909	0.612
R_frontalpole_surfavg	0	0.004	0.001

Table 18: Surface area: T1

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_surfavg	0.017	1	1	0.001	0.02	1
R_fusiform_surfavg	0.06	1	1	0.004	0.451	1
L_inferiorparietal_surfavg	0.016	1	1	0	0.179	0.255
R_inferiorparietal_surfavg	0.006	1	1	0.001	0.118	0.798

L_postcentral_surfavg	0.006	1	1	0.156	0.139	1
R_postcentral_surfavg	0.107	1	1	0.095	0.822	1
L_precentral_surfavg	0.015	1	0.223	0.046	1	0.55
R_precentral_surfavg	0	0.696	0.182	0.023	0.234	1
L_frontalpole_surfavg	NA	NA	NA	NA	NA	NA
R_frontalpole_surfavg	0.001	1	0.983	0	0.023	0.886

Table 19: Surface area: T2

	CW vs CM	CW vs TM	CW vs TW	CM vs TM	CM vs TW	TM vs TW
L_fusiform_surfavg	0.079	1	1	0.001	0.261	0.589
R_fusiform_surfavg	0.092	0.746	1	0.002	0.484	0.787
L_inferiorparietal_surfavg	0.006	1	1	0	0.185	0.141
R_inferiorparietal_surfavg	0.013	1	1	0.001	0.357	0.383
L_postcentral_surfavg	0.003	0.894	1	0.224	0.161	1
R_postcentral_surfavg	NA	NA	NA	NA	NA	NA
L_precentral_surfavg	0.021	1	0.355	0.021	1	0.374
R_precentral_surfavg	0	0.234	0.049	0.173	0.464	1
L_frontalpole_surfavg	NA	NA	NA	NA	NA	NA
R_frontalpole_surfavg	0.137	1	0.971	0.012	0.003	1