Supplementary Material - A worldwide study of white matter microstructural alterations in people living with Parkinson's Disease

1. Supplementary Results

1.1 Demographics: HY Subgroups and Controls

Oneway ANOVAs comparing the HY subgroups and controls demonstrated significant differences across the groups in:

- *Age*: [F(5, 2197) = 24.4, p<0.001)]
- *MMSE*: [F(5, 652) = 27.61, p<0.001)]
- *MoCA*: [F(5, 1070) = 72.0, p<0.001)]

A Chi-square test for independence was used to compare proportions of males and females between the HY subgroups and controls. We found:

- *Sex:* A significant difference in the proportions of males and females across the groups [X^2(1) = 40.28, p<0.001].

Oneway ANOVAs comparing just HY subgroups demonstrated significant differences across the groups in:

- *Disease duration*: [F(4,1243) = 133.9, p<0.001)]
- *Age- at-onset*: [F(4, 1251) = , p<0.001]
- *MDS-UPDRS-III (ON)*: [F(4,702) = 132.92, p<0.001)]
- *MDS-UPDRS (OFF)*: [F(4, 575) = 179.9, p<0.001)]

Post-hoc analyses using Tukey's Test with a family-wise error rate of 0.05 revealed the following significant between-group differences in demographic characteristics:

- *Age*: Controls were significantly older than HY1 participants, and significantly younger than HY2, HY3 and HY4 participants. HY1 participants were significantly younger than HY2, HY3 and HY4 participants, while HY2 participants were significantly younger than HY3 participants (p<0.05).
- *MMSE*: Controls had significantly higher MMSE scores than HY1, HY2, HY3 and HY4/5 participants (p<0.05).
- *MoCA*: Controls had significantly higher MoCA scores than HY1, HY2, HY3 and HY4/5 participants. HY1 participants had significantly higher MoCA scores than HY3 and HY4/5 scores. HY2 had significantly higher MoCA scors than HY2 and HY4/5, while HY3 had significantly higher MoCA scores than HY4/5 participants (p<0.05).
- *DURILL*: HY1 participants had significantly shorter disease duration than HY2, HY3 and HY4/5 participants. HY2 participants had significantly shorter disease duration than HY3 and HY4/5 participants, and HY3 participants had significantly shorter disease duration than HY4/5 participants (p<0.05).
- AAO: HY1 participants had an earlier age- at-onset than HY2 participants, while HY2 participants had a later age- at-onset than HY3 and HY4/5 participants (p<0.05).
- *MDS-UPDRS-III (ON)*: HY1 had significantly lower MDS-UPDRS-III ON scores than HY2, HY3 and HY4/5 participants. HY2 had significantly lower MDS-UPDRS-III ON scores than HY3 and HY4/5, and HY3 had significantly lower scores than HY4/5 participants (p<0.05).

- *MDS-UPDRS-III (OFF)*: HY1 had significantly lower MDS-UPDRS-III OFF scores than HY2, HY3 and HY4/5 participants. HY2 had significantly lower MDS-UPDRS-III OFF scores than HY3 and HY4/5, and HY3 had significantly lower scores than HY4/5 participants (p<0.05).

Post-hoc chi-square tests for independence were used to compare proportions of males and females between HY subgroups and controls. We found:

- Controls & HY1: Significant difference in the proportions of males and females across Controls and HY1 participants [$X^2(1) = 6.25$, p=0.012].
- Controls & HY2: Significant difference in the proportions of males and females across Controls and HY2 participants [$X^2(1) = 36.81$, p<0.001].
- Controls & HY3: Significant difference in the proportions of males and females across Controls and HY3 participants [$X^2(1) = 9.05$, p=0.003].
- Controls & HY4/5: No significant difference in the proportions of males and females across controls and HY4/5 participants [$X^2(1) = 0.14$, p=0.704].
- HY1 & HY2: No significant difference in the proportions of males and females across HY1 and HY2 participants [$X^2(1) = 3.08$, p=0.079].
- HY1 & HY3: No significant difference in the proportions of males and females across HY1 and HY3 participants [$X^2(1) = 0.28$, p=0.595].
- HY1 & HY4/5: No significant difference in the proportions of males and females across HY1 and HY4/5 participants [$X^2(1) = 0.61$, p=0.435].
- HY2 & HY3: No significant difference in the proportions of males and females across HY2 and HY3 participants [$X^2(1) = 0.73$, p=0.392].
- HY2 & HY4/5: Significant difference in the proportions of males and females across HY2 and HY4/5 participants [$X^2(1) = 3.85$, p=0.0498].
- HY3 & HY4/5: No significant difference in the proportions of males and females across HY3 and HY4/5 participants [$X^2(1) = 1.40$, p=0.238].

1.2 Demographics: Total PD and Controls

Independent samples *t*-tests were used to compare the mean age, MMSE and MoCA scores between the Total PD group and controls. We found that:

- *Age*: Control participants were younger than the Total PD cohort [t(2537)=-5.2, p<0.001]
- *MMSE*: Total PD cohort had lower scores on the MMSE [t(689) = -6.92, p<0.001]
- *MoCA*: Total PD cohort had lower scores on the MoCA [t(1207) = -9.12, p<0.001]

A Chi-square test for independence was used to compare proportions of males and females between the Total PD group and controls. We found:

- *Sex:* A significant difference in the proportions of males and females across the two groups [$X^2(1) = 44.41$, p<0.001].

1.3 UPDRS-III Scores

To address the issue of participants being assessed with either original UPDRS Part III (original UPDRS-III) or newer Movement Disorder Society UPDRS Part III scores (MDS-UPDRS-III), we used a validated formula to convert original UPDRS-III scores to predicted MDS-UPDRS-III scores. This is done by first taking the participant's original UPDRS-III score, multiplying that value by a weighting factor given the participant's HY stage, with the product then summed with an intercept factor, rounded to the nearest integer. For HY1

and 2, the MDS-UPDRS Part-III predicted score is calculated (UPDRS-III × 1.2) + 2.3. For HY3, the MDS-UPDRS-III predicted score is calculated (UPDRS-III × 1.2) + 1.0, and for HY4/5 the MDS-UPDRS-III predicted score is calculated (UPDRS-III × 1.1) + 7.5. Research has shown that true MDS-UPDRS Part-III scores and those derived from these formulas are highly correlated (Goetz, Stebbins, and Tilley 2012).

1.4 Between-group Differences in White Matter Microstructural Metrics

1.4.1 FA: Stratification by HY Stage

HY1 & Controls	*p*-value	Degrees of Freedom	Partial Cohen's *d*	Standard Error	Lower CI	Upper CI	p_{FDR}
Entire WM FA	0.00	1139	0.304	0.06	0.19	0.42	3.07×10^{-4}
ACR FA	0.01	1139	0.181	0.06	0.07	0.30	4.22×10^{-2}
SCR FA	0.04	1139	0.143	0.06	0.03	0.26	7.52×10^{-2}
PCR FA	0.15	1139	0.101	0.06	-0.01	0.22	1.93×10^{-1}
ALIC FA	0.01	1139	0.188	0.06	0.07	0.30	4.22×10^{-2}
PLIC FA	0.02	1139	0.168	0.06	0.05	0.28	5.07×10^{-2}
RLIC FA	0.01	1139	0.194	0.06	0.08	0.31	4.22×10^{-2}
EC FA	0.04	1139	0.147	0.06	0.03	0.26	7.52×10^{-2}
FX FA	0.30	1139	-0.072	0.06	-0.19	0.04	3.16×10^{-1}
FXST FA	0.30	1139	0.072	0.06	-0.04	0.19	3.16×10^{-1}
PTR FA	0.14	1139	0.104	0.06	-0.01	0.22	1.93×10^{-1}
GCC FA	0.01	1139	0.186	0.06	0.07	0.30	4.22×10^{-2}
BCC FA	0.03	1139	0.151	0.06	0.04	0.27	7.40×10^{-2}
SCC FA	0.04	1139	0.145	0.06	0.03	0.26	7.52×10^{-2}
CGC FA	0.62	1139	0.035	0.06	-0.08	0.15	6.18×10^{-1}
CGH FA	0.18	1139	0.093	0.06	-0.02	0.21	2.09×10^{-1}
CST FA	0.02	1139	0.157	0.06	0.04	0.27	6.60×10^{-2}
SFO FA	0.05	1139	0.138	0.06	0.02	0.25	8.04×10^{-2}
SLF FA	0.07	1139	0.128	0.06	0.01	0.24	1.06×10^{-1}
SS FA	0.02	1139	0.168	0.06	0.05	0.28	5.07×10^{-2}
TAP FA	0.16	1139	0.097	0.06	-0.02	0.21	1.99×10^{-1}
UNC FA	0.15	1139	0.101	0.06	-0.01	0.22	1.93×10^{-1}

HY2 & Controls	*p*-value	Degrees of Freedom	Partial Cohen's *d*	Standard Error	Lower CI	Upper CI	p_{FDR}
Entire WM FA	0.74	1606	0.016	0.05	-0.08	0.11	9.03×10^{-1}
ACR FA	0.49	1606	-0.035	0.05	-0.13	0.06	9.03×10^{-1}
SCR FA	0.07	1606	0.092	0.05	0.00	0.19	7.19×10^{-1}

PCR FA	0.87	1606	0.008	0.05	-0.09	0.11	9.07×10^{-1}
ALIC FA	0.68	1606	0.021	0.05	-0.08	0.12	9.03×10^{-1}
PLIC FA	0.18	1606	0.068	0.05	-0.03	0.16	9.03×10^{-1}
RLIC FA	0.49	1606	0.034	0.05	-0.06	0.13	9.03×10^{-1}
EC FA	0.82	1606	-0.011	0.05	-0.11	0.09	9.03×10^{-1}
FX FA	0.00	1606	-0.263	0.05	-0.36	-0.17	3.80×10^{-6}
FXST FA	0.33	1606	-0.049	0.05	-0.15	0.05	9.03×10^{-1}
PTR FA	0.56	1606	-0.029	0.05	-0.13	0.07	9.03×10^{-1}
GCC FA	0.71	1606	-0.019	0.05	-0.12	0.08	9.03×10^{-1}
BCC FA	0.92	1606	0.005	0.05	-0.09	0.10	9.17×10^{-1}
SCC FA	0.34	1606	0.048	0.05	-0.05	0.15	9.03×10^{-1}
CGC FA	0.26	1606	-0.057	0.05	-0.15	0.04	9.03×10^{-1}
CGH FA	0.58	1606	-0.028	0.05	-0.13	0.07	9.03×10^{-1}
CST FA	0.25	1606	0.058	0.05	-0.04	0.16	9.03×10^{-1}
SFO FA	0.41	1606	0.041	0.05	-0.06	0.14	9.03×10^{-1}
SLF FA	0.73	1606	0.017	0.05	-0.08	0.11	9.03×10^{-1}
SS FA	0.82	1606	-0.012	0.05	-0.11	0.09	9.03×10^{-1}
TAP FA	0.77	1606	0.014	0.05	-0.08	0.11	9.03×10^{-1}
UNC FA	0.28	1606	-0.054	0.05	-0.15	0.04	9.03×10^{-1}

HY3 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM FA	0.00	1085	-0.240	0.06	-0.36	-0.12	5.94×10^{-3}
ACR FA	0.00	1085	-0.326	0.06	-0.44	-0.21	2.17×10^{-4}
SCR FA	0.18	1085	-0.103	0.06	-0.22	0.02	2.43×10^{-1}
PCR FA	0.01	1085	-0.202	0.06	-0.32	-0.08	1.95×10^{-2}
ALIC FA	0.12	1085	-0.117	0.06	-0.24	0.00	2.21×10^{-1}
PLIC FA	0.60	1085	0.039	0.06	-0.08	0.16	6.37×10^{-1}
RLIC FA	0.14	1085	-0.112	0.06	-0.23	0.01	2.21×10^{-1}
EC FA	0.00	1085	-0.260	0.06	-0.38	-0.14	3.86×10^{-3}
FX FA	0.00	1085	-0.337	0.06	-0.46	-0.22	2.17×10^{-4}
FXST FA	0.00	1085	-0.236	0.06	-0.35	-0.12	6.22×10^{-3}
PTR FA	0.00	1085	-0.215	0.06	-0.33	-0.10	1.32×10^{-2}
GCC FA	0.02	1085	-0.181	0.06	-0.30	-0.06	3.83×10^{-2}
BCC FA	0.27	1085	-0.084	0.06	-0.20	0.03	3.47×10^{-1}
SCC FA	0.29	1085	-0.081	0.06	-0.20	0.04	3.52×10^{-1}

CGC FA	0.05	1085	-0.149	0.06	-0.27	-0.03	1.00×10^{-1}
CGH FA	0.16	1085	-0.106	0.06	-0.22	0.01	2.37×10^{-1}
CST FA	0.94	1085	-0.006	0.06	-0.12	0.11	9.37×10^{-1}
SFO FA	0.14	1085	-0.113	0.06	-0.23	0.00	2.21×10^{-1}
SLF FA	0.00	1085	-0.242	0.06	-0.36	-0.12	5.94×10^{-3}
SS FA	0.00	1085	-0.258	0.06	-0.38	-0.14	3.86×10^{-3}
TAP FA	0.61	1085	-0.039	0.06	-0.16	0.08	6.37×10^{-1}
UNC FA	0.34	1085	-0.073	0.06	-0.19	0.05	3.93×10^{-1}

HY4/5 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	**p_{FDR}**
Entire WM FA	0.00	940	-0.743	0.07	-0.87	-0.61	1.04×10^{-8}
ACR FA	0.00	940	-0.575	0.07	-0.70	-0.45	4.65×10^{-6}
SCR FA	0.00	940	-0.402	0.07	-0.53	-0.27	1.18×10^{-3}
PCR FA	0.00	940	-0.482	0.07	-0.61	-0.35	1.14×10^{-4}
ALIC FA	0.00	940	-0.606	0.07	-0.74	-0.48	1.61×10^{-6}
PLIC FA	0.02	940	-0.289	0.06	-0.42	-0.16	1.95×10^{-2}
RLIC FA	0.03	940	-0.268	0.06	-0.40	-0.14	2.89×10^{-2}
EC FA	0.00	940	-0.788	0.07	-0.92	-0.66	1.62×10^{-9}
FX FA	0.00	940	-1.013	0.07	-1.15	-0.88	6.15×10^{-15}
FXST FA	0.00	940	-0.555	0.07	-0.68	-0.43	9.53×10^{-6}
PTR FA	0.00	940	-0.691	0.07	-0.82	-0.56	6.80×10^{-8}
GCC FA	0.00	940	-0.690	0.07	-0.82	-0.56	6.80×10^{-8}
BCC FA	0.00	940	-0.669	0.07	-0.80	-0.54	1.48×10^{-7}
SCC FA	0.00	940	-0.511	0.07	-0.64	-0.38	4.53×10^{-5}
CGC FA	0.00	940	-0.718	0.07	-0.85	-0.59	2.70×10^{-8}
CGH FA	0.07	940	-0.224	0.06	-0.35	-0.10	6.58×10^{-2}
CST FA	0.00	940	-0.345	0.07	-0.47	-0.22	5.29×10^{-3}
SFO FA	0.00	940	-0.586	0.07	-0.72	-0.46	3.32×10^{-6}
SLF FA	0.00	940	-0.607	0.07	-0.74	-0.48	1.61×10^{-6}
SS FA	0.00	940	-0.443	0.07	-0.57	-0.31	3.70×10^{-4}
TAP FA	0.00	940	-0.450	0.07	-0.58	-0.32	3.09×10^{-4}
UNC FA	0.00	940	-0.624	0.07	-0.75	-0.49	9.46×10^{-7}

1.4.2 FA: Stratification by HY Stage - Matched Control Samples

HY1 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	**p_{FDR}**

Entire WM FA	0.00	529	0.271	0.09	0.10	0.44	4.27×10^{-2}
ACR FA	0.19	529	0.114	0.09	-0.05	0.28	3.59×10^{-1}
SCR FA	0.01	529	0.241	0.09	0.07	0.41	4.28×10^{-2}
PCR FA	0.11	529	0.141	0.09	-0.03	0.31	2.92×10^{-1}
ALIC FA	0.01	529	0.243	0.09	0.08	0.41	4.28×10^{-2}
PLIC FA	0.01	529	0.231	0.09	0.06	0.40	4.55×10^{-2}
RLIC FA	0.02	529	0.204	0.09	0.04	0.37	8.60×10^{-2}
EC FA	0.06	529	0.163	0.09	0.00	0.33	1.91×10^{-1}
FX FA	0.15	529	-0.125	0.09	-0.29	0.04	3.36×10^{-1}
FXST FA	0.94	529	-0.007	0.09	-0.17	0.16	9.83×10^{-1}
PTR FA	0.48	529	0.062	0.09	-0.11	0.23	5.44×10^{-1}
GCC FA	0.21	529	0.109	0.09	-0.06	0.28	3.59×10^{-1}
BCC FA	0.28	529	0.095	0.09	-0.07	0.26	4.35×10^{-1}
SCC FA	0.49	529	0.059	0.09	-0.11	0.23	5.44×10^{-1}
CGC FA	1.00	529	0.000	0.09	-0.17	0.17	9.98×10^{-1}
CGH FA	0.37	529	0.078	0.09	-0.09	0.25	5.11×10^{-1}
CST FA	0.42	529	0.070	0.09	-0.10	0.24	5.15×10^{-1}
SFO FA	0.15	529	0.127	0.09	-0.04	0.29	3.36×10^{-1}
SLF FA	0.33	529	0.084	0.09	-0.08	0.25	4.89×10^{-1}
SS FA	0.05	529	0.169	0.09	0.00	0.34	1.91×10^{-1}
TAP FA	0.20	529	0.112	0.09	-0.06	0.28	3.59×10^{-1}
UNC FA	0.42	529	0.070	0.09	-0.10	0.24	5.15×10^{-1}

HY2 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM FA	0.85	1463	0.010	0.05	-0.09	0.11	9.84×10^{-1}
ACR FA	0.46	1463	-0.039	0.05	-0.14	0.06	9.43×10^{-1}
SCR FA	0.08	1463	0.093	0.05	-0.01	0.20	8.25×10^{-1}
PCR FA	0.99	1463	-0.001	0.05	-0.10	0.10	9.90×10^{-1}
ALIC FA	0.85	1463	0.010	0.05	-0.09	0.11	9.84×10^{-1}
PLIC FA	0.16	1463	0.074	0.05	-0.03	0.18	9.43×10^{-1}
RLIC FA	0.67	1463	0.022	0.05	-0.08	0.12	9.84×10^{-1}
EC FA	0.86	1463	-0.009	0.05	-0.11	0.09	9.84×10^{-1}
FX FA	0.00	1463	-0.279	0.05	-0.38	-0.18	2.32×10^{-6}
FXST FA	0.32	1463	-0.052	0.05	-0.15	0.05	9.43×10^{-1}

PTR FA	0.39	1463	-0.045	0.05	-0.15	0.06	9.43×10^{-1}
GCC FA	0.68	1463	-0.021	0.05	-0.12	0.08	9.84×10^{-1}
BCC FA	0.89	1463	-0.007	0.05	-0.11	0.09	9.84×10^{-1}
SCC FA	0.40	1463	0.044	0.05	-0.06	0.15	9.43×10^{-1}
CGC FA	0.25	1463	-0.061	0.05	-0.16	0.04	9.43×10^{-1}
CGH FA	0.64	1463	-0.024	0.05	-0.13	0.08	9.84×10^{-1}
CST FA	0.36	1463	0.047	0.05	-0.05	0.15	9.43×10^{-1}
SFO FA	0.47	1463	0.038	0.05	-0.06	0.14	9.43×10^{-1}
SLF FA	0.82	1463	0.012	0.05	-0.09	0.11	9.84×10^{-1}
SS FA	0.80	1463	-0.013	0.05	-0.12	0.09	9.84×10^{-1}
TAP FA	0.96	1463	-0.002	0.05	-0.10	0.10	9.90×10^{-1}
UNC FA	0.24	1463	-0.061	0.05	-0.16	0.04	9.43×10^{-1}

HY3 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	**p_{FDR}**
Entire WM FA	0.04	420	-0.203	0.10	-0.39	-0.02	1.40×10^{-1}
ACR FA	0.01	420	-0.265	0.10	-0.45	-0.08	5.10×10^{-2}
SCR FA	0.58	420	-0.054	0.10	-0.24	0.13	7.52×10^{-1}
PCR FA	0.25	420	-0.113	0.10	-0.30	0.07	4.99×10^{-1}
ALIC FA	0.57	420	-0.055	0.10	-0.24	0.13	7.52×10^{-1}
PLIC FA	0.41	420	0.080	0.10	-0.11	0.27	6.05×10^{-1}
RLIC FA	0.75	420	-0.031	0.10	-0.22	0.16	8.69×10^{-1}
EC FA	0.02	420	-0.226	0.10	-0.41	-0.04	9.29×10^{-2}
FX FA	0.00	420	-0.319	0.10	-0.51	-0.13	2.61×10^{-2}
FXST FA	0.02	420	-0.230	0.10	-0.42	-0.04	9.29×10^{-2}
PTR FA	0.06	420	-0.187	0.10	-0.37	0.00	1.74×10^{-1}
GCC FA	0.12	420	-0.154	0.10	-0.34	0.03	2.83×10^{-1}
BCC FA	0.36	420	-0.090	0.10	-0.28	0.10	6.05×10^{-1}
SCC FA	0.65	420	-0.045	0.10	-0.23	0.14	7.89×10^{-1}
CGC FA	0.13	420	-0.147	0.10	-0.33	0.04	2.90×10^{-1}
CGH FA	0.36	420	-0.089	0.10	-0.28	0.10	6.05×10^{-1}
CST FA	0.91	420	0.012	0.10	-0.18	0.20	9.44×10^{-1}
SFO FA	0.39	420	-0.083	0.10	-0.27	0.10	6.05×10^{-1}
SLF FA	0.06	420	-0.182	0.10	-0.37	0.01	1.74×10^{-1}
SS FA	0.00	420	-0.290	0.10	-0.48	-0.10	3.46×10^{-2}
TAP FA	0.90	420	-0.012	0.10	-0.20	0.18	9.44×10^{-1}

UNC FA	0.94	420	0.007	0.10	-0.18	0.19	9.44×10^{-1}

HY4/5 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM FA	0.00	131	-0.569	0.17	-0.90	-0.24	6.36×10^{-3}
ACR FA	0.00	131	-0.522	0.17	-0.85	-0.19	8.24×10^{-3}
SCR FA	0.03	131	-0.386	0.17	-0.71	-0.06	3.33×10^{-2}
PCR FA	0.01	131	-0.449	0.17	-0.77	-0.12	1.79×10^{-2}
ALIC FA	0.00	131	-0.507	0.17	-0.83	-0.18	9.61×10^{-3}
PLIC FA	0.31	131	-0.180	0.16	-0.50	0.14	3.05×10^{-1}
RLIC FA	0.09	131	-0.303	0.17	-0.63	0.02	9.42×10^{-2}
EC FA	0.00	131	-0.650	0.17	-0.98	-0.32	3.24×10^{-3}
FX FA	0.00	131	-1.097	0.18	-1.44	-0.75	1.02×10^{-7}
FXST FA	0.02	131	-0.400	0.17	-0.73	-0.07	2.89×10^{-2}
PTR FA	0.00	131	-0.535	0.17	-0.86	-0.21	7.40×10^{-3}
GCC FA	0.00	131	-0.541	0.17	-0.87	-0.21	7.40×10^{-3}
BCC FA	0.01	131	-0.499	0.17	-0.83	-0.17	1.00×10^{-2}
SCC FA	0.02	131	-0.427	0.17	-0.75	-0.10	2.18×10^{-2}
CGC FA	0.00	131	-0.617	0.17	-0.95	-0.29	4.22×10^{-3}
CGH FA	0.02	131	-0.411	0.17	-0.74	-0.09	2.60×10^{-2}
CST FA	0.26	131	-0.196	0.16	-0.52	0.13	2.76×10^{-1}
SFO FA	0.00	131	-0.574	0.17	-0.90	-0.25	6.36×10^{-3}
SLF FA	0.01	131	-0.476	0.17	-0.80	-0.15	1.35×10^{-2}
SS FA	0.01	131	-0.440	0.17	-0.77	-0.11	1.90×10^{-2}
TAP FA	0.01	131	-0.450	0.17	-0.78	-0.12	1.79×10^{-2}
UNC FA	0.00	131	-0.541	0.17	-0.87	-0.21	7.40×10^{-3}

1.4.3 MD: Stratification by HY Stage

HY1 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM MD	0.00	1139	-0.198	0.06	-0.31	-0.08	1.98×10^{-2}
ACR MD	0.08	1139	-0.122	0.06	-0.24	-0.01	1.45×10^{-1}
SCR MD	0.57	1139	-0.039	0.06	-0.15	0.08	6.02×10^{-1}
PCR MD	0.22	1139	-0.085	0.06	-0.20	0.03	3.05×10^{-1}
ALIC MD	0.01	1139	-0.182	0.06	-0.30	-0.07	3.35×10^{-2}
PLIC MD	0.02	1139	-0.157	0.06	-0.27	-0.04	7.82×10^{-2}

RLIC MD	0.00	1139	-0.272	0.06	-0.39	-0.16	2.26×10^{-3}
EC MD	0.07	1139	-0.128	0.06	-0.24	-0.01	1.35×10^{-1}
FX MD	0.51	1139	-0.046	0.06	-0.16	0.07	6.02×10^{-1}
FXST MD	0.00	1139	-0.220	0.06	-0.34	-0.10	1.02×10^{-2}
PTR MD	0.10	1139	-0.115	0.06	-0.23	0.00	1.57×10^{-1}
GCC MD	0.05	1139	-0.135	0.06	-0.25	-0.02	1.17×10^{-1}
BCC MD	0.34	1139	0.067	0.06	-0.05	0.18	4.36×10^{-1}
SCC MD	0.77	1139	0.020	0.06	-0.10	0.14	7.74×10^{-1}
CGC MD	0.04	1139	-0.147	0.06	-0.26	-0.03	9.72×10^{-2}
CGH MD	0.00	1139	-0.217	0.06	-0.33	-0.10	1.02×10^{-2}
CST MD	0.05	1139	-0.140	0.06	-0.25	-0.02	1.11×10^{-1}
SFO MD	0.57	1139	-0.039	0.06	-0.15	0.08	6.02×10^{-1}
SLF MD	0.11	1139	-0.112	0.06	-0.23	0.00	1.58×10^{-1}
SS MD	0.00	1139	-0.253	0.06	-0.37	-0.14	3.32×10^{-3}
TAP MD	0.54	1139	-0.043	0.06	-0.16	0.07	6.02×10^{-1}
UNC MD	0.09	1139	-0.119	0.06	-0.23	0.00	1.50×10^{-1}

HY2 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM MD	0.58	1606	-0.028	0.05	-0.12	0.07	8.53×10^{-1}
ACR MD	0.87	1606	0.008	0.05	-0.09	0.11	9.38×10^{-1}
SCR MD	0.83	1606	-0.011	0.05	-0.11	0.09	9.38×10^{-1}
PCR MD	0.88	1606	0.008	0.05	-0.09	0.11	9.38×10^{-1}
ALIC MD	0.02	1606	-0.119	0.05	-0.22	-0.02	6.41×10^{-2}
PLIC MD	0.01	1606	-0.126	0.05	-0.22	-0.03	5.20×10^{-2}
RLIC MD	0.00	1606	-0.195	0.05	-0.29	-0.10	1.10×10^{-3}
EC MD	0.53	1606	-0.032	0.05	-0.13	0.07	8.29×10^{-1}
FX MD	0.00	1606	0.152	0.05	0.05	0.25	1.39×10^{-2}
FXST MD	0.00	1606	-0.221	0.05	-0.32	-0.12	2.43×10^{-4}
PTR MD	0.27	1606	-0.055	0.05	-0.15	0.04	5.43×10^{-1}
GCC MD	0.90	1606	-0.007	0.05	-0.10	0.09	9.38×10^{-1}
BCC MD	0.70	1606	0.020	0.05	-0.08	0.12	9.38×10^{-1}
SCC MD	0.98	1606	-0.002	0.05	-0.10	0.10	9.76×10^{-1}
CGC MD	0.09	1606	-0.086	0.05	-0.18	0.01	2.34×10^{-1}
CGH MD	0.00	1606	-0.187	0.05	-0.28	-0.09	1.40×10^{-3}
CST MD	0.17	1606	-0.069	0.05	-0.17	0.03	4.15×10^{-1}

SFO MD	0.25	1606	-0.058	0.05	-0.15	0.04	5.43×10^{-1}
SLF MD	0.51	1606	-0.033	0.05	-0.13	0.06	8.29×10^{-1}
SS MD	0.05	1606	-0.100	0.05	-0.20	0.00	1.47×10^{-1}
TAP MD	0.49	1606	0.034	0.05	-0.06	0.13	8.29×10^{-1}
UNC MD	0.82	1606	0.012	0.05	-0.09	0.11	9.38×10^{-1}

HY3 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM MD	0.26	1085	0.086	0.06	-0.03	0.20	4.72×10^{-1}
ACR MD	0.00	1085	0.216	0.06	0.10	0.33	5.13×10^{-2}
SCR MD	0.06	1085	0.145	0.06	0.03	0.26	1.79×10^{-1}
PCR MD	0.05	1085	0.150	0.06	0.03	0.27	1.79×10^{-1}
ALIC MD	0.45	1085	-0.058	0.06	-0.18	0.06	5.82×10^{-1}
PLIC MD	0.20	1085	-0.097	0.06	-0.21	0.02	4.07×10^{-1}
RLIC MD	0.31	1085	-0.077	0.06	-0.19	0.04	5.28×10^{-1}
EC MD	0.16	1085	0.107	0.06	-0.01	0.23	3.91×10^{-1}
FX MD	0.00	1085	0.222	0.06	0.10	0.34	5.13×10^{-2}
FXST MD	0.95	1085	-0.005	0.06	-0.12	0.11	9.84×10^{-1}
PTR MD	0.78	1085	0.021	0.06	-0.10	0.14	9.00×10^{-1}
GCC MD	0.35	1085	0.071	0.06	-0.05	0.19	5.53×10^{-1}
BCC MD	0.19	1085	0.099	0.06	-0.02	0.22	4.07×10^{-1}
SCC MD	0.98	1085	0.002	0.06	-0.12	0.12	9.84×10^{-1}
CGC MD	0.67	1085	-0.032	0.06	-0.15	0.09	8.18×10^{-1}
CGH MD	0.04	1085	-0.160	0.06	-0.28	-0.04	1.79×10^{-1}
CST MD	0.91	1085	0.009	0.06	-0.11	0.13	9.84×10^{-1}
SFO MD	0.04	1085	0.156	0.06	0.04	0.27	1.79×10^{-1}
SLF MD	0.16	1085	0.107	0.06	-0.01	0.23	3.91×10^{-1}
SS MD	0.45	1085	0.058	0.06	-0.06	0.18	5.82×10^{-1}
TAP MD	0.05	1085	0.150	0.06	0.03	0.27	1.79×10^{-1}
UNC MD	0.42	1085	0.061	0.06	-0.06	0.18	5.82×10^{-1}

HY4/5 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM MD	0.07	940	0.222	0.06	0.10	0.35	1.36×10^{-1}
ACR MD	0.00	940	0.410	0.07	0.28	0.54	4.20×10^{-3}
SCR MD	0.00	940	0.413	0.07	0.28	0.54	4.20×10^{-3}

PCR MD	0.06	940	0.232	0.06	0.11	0.36	1.24×10^{-1}
ALIC MD	0.51	940	0.079	0.06	-0.05	0.21	5.81×10^{-1}
PLIC MD	0.04	940	-0.253	0.06	-0.38	-0.13	9.29×10^{-2}
RLIC MD	0.08	940	-0.213	0.06	-0.34	-0.09	1.48×10^{-1}
EC MD	0.01	940	0.331	0.07	0.20	0.46	2.41×10^{-2}
FX MD	0.00	940	0.689	0.07	0.56	0.82	4.11×10^{-7}
FXST MD	0.98	940	0.003	0.06	-0.12	0.13	9.78×10^{-1}
PTR MD	0.43	940	-0.096	0.06	-0.22	0.03	5.27×10^{-1}
GCC MD	0.00	940	0.380	0.07	0.25	0.51	8.03×10^{-3}
BCC MD	0.01	940	0.307	0.06	0.18	0.43	3.19×10^{-2}
SCC MD	0.75	940	-0.039	0.06	-0.17	0.09	7.86×10^{-1}
CGC MD	0.31	940	-0.124	0.06	-0.25	0.00	4.22×10^{-1}
CGH MD	0.01	940	-0.325	0.07	-0.45	-0.20	2.41×10^{-2}
CST MD	0.10	940	-0.202	0.06	-0.33	-0.08	1.63×10^{-1}
SFO MD	0.00	940	0.459	0.07	0.33	0.59	1.84×10^{-3}
SLF MD	0.42	940	0.097	0.06	-0.03	0.22	5.27×10^{-1}
SS MD	0.15	940	-0.175	0.06	-0.30	-0.05	2.21×10^{-1}
TAP MD	0.12	940	0.188	0.06	0.06	0.32	1.91×10^{-1}
UNC MD	0.53	940	0.077	0.06	-0.05	0.20	5.81×10^{-1}

1.4.4 MD: Stratification by HY Stage - Matched Control Samples

HY1 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM MD	0.16	529	-0.123	0.09	-0.29	0.04	4.92×10^{-1}
ACR MD	0.44	529	-0.067	0.09	-0.23	0.10	7.03×10^{-1}
SCR MD	0.95	529	-0.006	0.09	-0.17	0.16	9.48×10^{-1}
PCR MD	0.64	529	-0.040	0.09	-0.21	0.13	7.43×10^{-1}
ALIC MD	0.06	529	-0.162	0.09	-0.33	0.01	3.49×10^{-1}
PLIC MD	0.18	529	-0.117	0.09	-0.28	0.05	4.92×10^{-1}
RLIC MD	0.01	529	-0.217	0.09	-0.39	-0.05	2.00×10^{-1}
EC MD	0.25	529	-0.099	0.09	-0.27	0.07	5.60×10^{-1}
FX MD	0.64	529	0.041	0.09	-0.13	0.21	7.43×10^{-1}
FXST MD	0.06	529	-0.163	0.09	-0.33	0.00	3.49×10^{-1}
PTR MD	0.41	529	-0.072	0.09	-0.24	0.10	7.03×10^{-1}
GCC MD	0.14	529	-0.128	0.09	-0.30	0.04	4.92×10^{-1}
BCC MD	0.57	529	0.050	0.09	-0.12	0.22	7.35×10^{-1}

SCC MD	0.50	529	0.059	0.09	-0.11	0.23	7.03×10^{-1}
CGC MD	0.37	529	-0.079	0.09	-0.25	0.09	7.03×10^{-1}
CGH MD	0.11	529	-0.141	0.09	-0.31	0.03	4.64×10^{-1}
CST MD	0.21	529	-0.108	0.09	-0.28	0.06	5.23×10^{-1}
SFO MD	0.94	529	0.006	0.09	-0.16	0.17	9.48×10^{-1}
SLF MD	0.51	529	-0.057	0.09	-0.22	0.11	7.03×10^{-1}
SS MD	0.02	529	-0.206	0.09	-0.37	-0.04	2.00×10^{-1}
TAP MD	0.73	529	-0.030	0.09	-0.20	0.14	8.03×10^{-1}
UNC MD	0.49	529	-0.060	0.09	-0.23	0.11	7.03×10^{-1}

HY2 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM MD	0.66	1463	-0.023	0.05	-0.12	0.08	9.07×10^{-1}
ACR MD	0.81	1463	0.012	0.05	-0.09	0.11	9.28×10^{-1}
SCR MD	0.89	1463	-0.008	0.05	-0.11	0.09	9.28×10^{-1}
PCR MD	0.70	1463	0.020	0.05	-0.08	0.12	9.12×10^{-1}
ALIC MD	0.02	1463	-0.125	0.05	-0.23	-0.02	6.08×10^{-2}
PLIC MD	0.01	1463	-0.140	0.05	-0.24	-0.04	3.22×10^{-2}
RLIC MD	0.00	1463	-0.190	0.05	-0.29	-0.09	2.11×10^{-3}
EC MD	0.48	1463	-0.037	0.05	-0.14	0.07	8.19×10^{-1}
FX MD	0.00	1463	0.154	0.05	0.05	0.26	1.83×10^{-2}
FXST MD	0.00	1463	-0.222	0.05	-0.32	-0.12	5.23×10^{-4}
PTR MD	0.44	1463	-0.040	0.05	-0.14	0.06	8.07×10^{-1}
GCC MD	0.95	1463	-0.003	0.05	-0.10	0.10	9.53×10^{-1}
BCC MD	0.56	1463	0.031	0.05	-0.07	0.13	8.74×10^{-1}
SCC MD	0.86	1463	0.009	0.05	-0.09	0.11	9.28×10^{-1}
CGC MD	0.13	1463	-0.078	0.05	-0.18	0.02	3.70×10^{-1}
CGH MD	0.00	1463	-0.192	0.05	-0.29	-0.09	2.11×10^{-3}
CST MD	0.19	1463	-0.069	0.05	-0.17	0.03	4.55×10^{-1}
SFO MD	0.36	1463	-0.048	0.05	-0.15	0.05	7.12×10^{-1}
SLF MD	0.64	1463	-0.024	0.05	-0.13	0.08	9.07×10^{-1}
SS MD	0.06	1463	-0.097	0.05	-0.20	0.01	2.03×10^{-1}
TAP MD	0.28	1463	0.056	0.05	-0.05	0.16	6.27×10^{-1}
UNC MD	0.79	1463	0.014	0.05	-0.09	0.12	9.28×10^{-1}

HY3 &	***p*-value**	**Degrees of**	**Partial**	**Standard**	**Lower CI**	**Upper CI**	p_{FDR}

Matched Controls		Freedom	Cohen's *d*	Error			
Entire WM MD	0.79	420	0.026	0.10	-0.16	0.21	8.70×10^{-1}
ACR MD	0.11	420	0.156	0.10	-0.03	0.34	6.03×10^{-1}
SCR MD	0.59	420	0.052	0.10	-0.14	0.24	8.70×10^{-1}
PCR MD	0.56	420	0.056	0.10	-0.13	0.24	8.70×10^{-1}
ALIC MD	0.25	420	-0.112	0.10	-0.30	0.08	7.93×10^{-1}
PLIC MD	0.23	420	-0.116	0.10	-0.30	0.07	7.93×10^{-1}
RLIC MD	0.09	420	-0.168	0.10	-0.36	0.02	6.03×10^{-1}
EC MD	0.85	420	0.018	0.10	-0.17	0.21	8.70×10^{-1}
FX MD	0.03	420	0.216	0.10	0.03	0.40	5.97×10^{-1}
FXST MD	0.56	420	-0.058	0.10	-0.24	0.13	8.70×10^{-1}
PTR MD	0.53	420	-0.061	0.10	-0.25	0.13	8.70×10^{-1}
GCC MD	0.67	420	0.042	0.10	-0.15	0.23	8.70×10^{-1}
BCC MD	0.42	420	0.080	0.10	-0.11	0.27	8.70×10^{-1}
SCC MD	0.82	420	-0.022	0.10	-0.21	0.17	8.70×10^{-1}
CGC MD	0.35	420	-0.091	0.10	-0.28	0.10	8.70×10^{-1}
CGH MD	0.05	420	-0.188	0.10	-0.38	0.00	5.97×10^{-1}
CST MD	0.75	420	0.031	0.10	-0.16	0.22	8.70×10^{-1}
SFO MD	0.19	420	0.129	0.10	-0.06	0.32	7.93×10^{-1}
SLF MD	0.83	420	0.021	0.10	-0.17	0.21	8.70×10^{-1}
SS MD	0.87	420	-0.016	0.10	-0.20	0.17	8.70×10^{-1}
TAP MD	0.47	420	0.070	0.10	-0.12	0.26	8.70×10^{-1}
UNC MD	0.84	420	-0.020	0.10	-0.21	0.17	8.70×10^{-1}

HY4/5 & Matched Controls	*p*-value	Degrees of Freedom	Partial Cohen's *d*	Standard Error	Lower CI	Upper CI	p_{FDR}
Entire WM MD	0.48	131	0.122	0.16	-0.20	0.44	6.67×10^{-1}
ACR MD	0.06	131	0.330	0.17	0.01	0.65	4.34×10^{-1}
SCR MD	0.04	131	0.362	0.17	0.04	0.69	4.34×10^{-1}
PCR MD	0.18	131	0.237	0.16	-0.09	0.56	4.86×10^{-1}
ALIC MD	0.48	131	0.122	0.16	-0.20	0.45	6.67×10^{-1}
PLIC MD	0.48	131	-0.123	0.16	-0.45	0.20	6.67×10^{-1}
RLIC MD	0.27	131	-0.194	0.16	-0.52	0.13	5.40×10^{-1}
EC MD	0.22	131	0.214	0.16	-0.11	0.54	4.89×10^{-1}
FX MD	0.00	131	0.723	0.17	0.39	1.06	1.38×10^{-3}

FXST MD	0.96	131	-0.009	0.16	-0.33	0.31	9.61×10^{-1}
PTR MD	0.85	131	-0.034	0.16	-0.36	0.29	8.86×10^{-1}
GCC MD	0.11	131	0.279	0.17	-0.04	0.60	4.76×10^{-1}
BCC MD	0.47	131	0.127	0.16	-0.20	0.45	6.67×10^{-1}
SCC MD	0.77	131	-0.052	0.16	-0.37	0.27	8.57×10^{-1}
CGC MD	0.63	131	-0.083	0.16	-0.41	0.24	8.20×10^{-1}
CGH MD	0.14	131	-0.257	0.17	-0.58	0.07	4.76×10^{-1}
CST MD	0.15	131	-0.252	0.17	-0.58	0.07	4.76×10^{-1}
SFO MD	0.08	131	0.309	0.17	-0.01	0.63	4.34×10^{-1}
SLF MD	0.73	131	0.061	0.16	-0.26	0.38	8.57×10^{-1}
SS MD	0.34	131	-0.167	0.16	-0.49	0.16	6.23×10^{-1}
TAP MD	0.22	131	0.217	0.16	-0.11	0.54	4.89×10^{-1}
UNC MD	0.78	131	0.049	0.16	-0.27	0.37	8.57×10^{-1}

1.4.5 AD: Stratification by HY Stage

HY1 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM AD	0.09	1139	-0.119	0.059	-0.23	0.00	1.95×10^{-1}
ACR AD	0.55	1139	-0.042	0.059	-0.16	0.07	7.09×10^{-1}
SCR AD	0.65	1139	0.031	0.059	-0.08	0.15	7.57×10^{-1}
PCR AD	0.36	1139	-0.064	0.059	-0.18	0.05	4.93×10^{-1}
ALIC AD	0.02	1139	-0.160	0.059	-0.27	-0.04	8.14×10^{-2}
PLIC AD	0.25	1139	-0.080	0.059	-0.19	0.04	4.29×10^{-1}
RLIC AD	0.00	1139	-0.251	0.059	-0.37	-0.14	4.49×10^{-3}
EC AD	0.21	1139	-0.087	0.059	-0.20	0.03	3.86×10^{-1}
FX AD	0.08	1139	-0.124	0.059	-0.24	-0.01	1.86×10^{-1}
FXST AD	0.00	1139	-0.213	0.059	-0.33	-0.10	1.18×10^{-2}
PTR AD	0.30	1139	-0.073	0.059	-0.19	0.04	4.35×10^{-1}
GCC AD	0.62	1139	-0.035	0.059	-0.15	0.08	7.53×10^{-1}
BCC AD	0.00	1139	0.210-	0.059	0.09	0.33	1.18×10^{-2}
SCC AD	0.06	1139	0.132	0.059	0.02	0.25	1.60×10^{-1}
CGC AD	0.05	1139	-0.135	0.059	-0.25	-0.02	1.60×10^{-1}
CGH AD	0.00	1139	-0.247	0.059	-0.36	-0.13	4.49×10^{-3}
CST AD	0.74	1139	-0.023	0.059	-0.14	0.09	8.19×10^{-1}
SFO AD	0.86	1139	0.012	0.059	-0.10	0.13	8.59×10^{-1}
SLF AD	0.16	1139	-0.097	0.059	-0.21	0.02	3.25×10^{-1}

SS AD	0.00	1139	-0.233	0.059	-0.35	-0.12	6.29×10^{-3}
TAP AD	0.84	1139	0.014	0.059	-0.10	0.13	8.59×10^{-1}
UNC AD	0.28	1139	-0.075	0.059	-0.19	0.04	4.35×10^{-1}

HY2 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM AD	0.11	1606	-0.079	0.050	-0.18	0.02	2.77×10^{-1}
ACR AD	0.50	1606	-0.034	0.050	-0.13	0.06	5.74×10^{-1}
SCR AD	0.44	1606	0.039	0.050	-0.06	0.14	5.40×10^{-1}
PCR AD	0.88	1606	-0.007	0.050	-0.10	0.09	8.84×10^{-1}
ALIC AD	0.00	1606	-0.162	0.050	-0.26	-0.06	6.85×10^{-3}
PLIC AD	0.08	1606	-0.087	0.050	-0.18	0.01	2.29×10^{-1}
RLIC AD	0.00	1606	-0.235	0.050	-0.33	-0.14	2.16×10^{-5}
EC AD	0.37	1606	-0.045	0.050	-0.14	0.05	5.40×10^{-1}
FX AD	0.17	1606	0.069	0.050	-0.03	0.17	3.69×10^{-1}
FXST AD	0.00	1606	-0.274	0.050	-0.37	-0.18	5.85×10^{-7}
PTR AD	0.02	1606	-0.119	0.050	-0.22	-0.02	5.47×10^{-2}
GCC AD	0.63	1606	-0.024	0.050	-0.12	0.07	6.88×10^{-1}
BCC AD	0.79	1606	0.014	0.050	-0.08	0.11	8.24×10^{-1}
SCC AD	0.44	1606	0.039	0.050	-0.06	0.14	5.40×10^{-1}
CGC AD	0.01	1606	-0.133	0.050	-0.23	-0.04	2.86×10^{-2}
CGH AD	0.00	1606	-0.279	0.050	-0.38	-0.18	5.85×10^{-7}
CST AD	0.24	1606	-0.059	0.050	-0.16	0.04	3.77×10^{-1}
SFO AD	0.21	1606	-0.063	0.050	-0.16	0.03	3.69×10^{-1}
SLF AD	0.22	1606	-0.062	0.050	-0.16	0.04	3.69×10^{-1}
SS AD	0.00	1606	-0.157	0.050	-0.25	-0.06	7.87×10^{-3}
TAP AD	0.40	1606	0.042	0.050	-0.06	0.14	5.40×10^{-1}
UNC AD	0.21	1606	-0.062	0.050	-0.16	0.04	3.69×10^{-1}

HY3 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM AD	0.18	1085	-0.103	0.060	-0.22	0.02	3.66×10^{-1}
ACR AD	0.68	1085	0.032	0.060	-0.09	0.15	6.75×10^{-1}
SCR AD	0.48	1085	0.053	0.060	-0.06	0.17	6.75×10^{-1}
PCR AD	0.65	1085	0.035	0.060	-0.08	0.15	6.75×10^{-1}
ALIC AD	0.02	1085	-0.181	0.060	-0.30	-0.06	1.28×10^{-1}

PLIC AD	0.37	1085	-0.068	0.060	-0.19	0.05	6.42×10^{-1}
RLIC AD	0.03	1085	-0.168	0.060	-0.29	-0.05	1.48×10^{-1}
EC AD	0.67	1085	-0.033	0.060	-0.15	0.09	6.75×10^{-1}
FX AD	0.16	1085	0.108	0.060	-0.01	0.23	3.66×10^{-1}
FXST AD	0.01	1085	-0.189	0.060	-0.31	-0.07	1.28×10^{-1}
PTR AD	0.04	1085	-0.155	0.060	-0.27	-0.04	1.83×10^{-1}
GCC AD	0.42	1085	-0.061	0.060	-0.18	0.06	6.61×10^{-1}
BCC AD	0.56	1085	0.045	0.060	-0.07	0.16	6.75×10^{-1}
SCC AD	0.55	1085	-0.045	0.060	-0.16	0.07	6.75×10^{-1}
CGC AD	0.05	1085	-0.147	0.060	-0.27	-0.03	1.83×10^{-1}
CGH AD	0.00	1085	-0.277	0.061	-0.40	-0.16	6.24×10^{-3}
CST AD	0.64	1085	0.036	0.060	-0.08	0.15	6.75×10^{-1}
SFO AD	0.18	1085	0.101	0.060	-0.02	0.22	3.66×10^{-1}
SLF AD	0.38	1085	-0.067	0.060	-0.18	0.05	6.42×10^{-1}
SS AD	0.13	1085	-0.114	0.060	-0.23	0.00	3.66×10^{-1}
TAP AD	0.06	1085	0.144	0.060	0.03	0.26	1.83×10^{-1}
UNC AD	0.61	1085	-0.038	0.060	-0.16	0.08	6.75×10^{-1}

HY4/5 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM AD	0.00	940	-0.354	0.065	-0.48	-0.23	6.69×10^{-3}
ACR AD	0.51	940	0.079	0.065	-0.05	0.21	5.96×10^{-1}
SCR AD	0.17	940	0.168	0.065	0.04	0.30	2.44×10^{-1}
PCR AD	0.89	940	-0.016	0.065	-0.14	0.11	8.93×10^{-1}
ALIC AD	0.02	940	-0.275	0.065	-0.40	-0.15	3.77×10^{-2}
PLIC AD	0.00	940	-0.387	0.065	-0.51	-0.26	3.31×10^{-3}
RLIC AD	0.00	940	-0.409	0.065	-0.54	-0.28	2.17×10^{-3}
EC AD	0.30	940	-0.125	0.065	-0.25	0.00	3.91×10^{-1}
FX AD	0.00	940	0.431	0.065	0.30	0.56	1.28×10^{-3}
FXST AD	0.00	940	-0.440	0.065	-0.57	-0.31	1.15×10^{-3}
PTR AD	0.00	940	-0.673	0.066	-0.80	-0.54	8.82×10^{-7}
GCC AD	0.77	940	-0.035	0.065	-0.16	0.09	8.10×10^{-1}
BCC AD	0.20	940	-0.155	0.065	-0.28	-0.03	2.79×10^{-1}
SCC AD	0.01	940	-0.321	0.065	-0.45	-0.19	1.41×10^{-2}
CGC AD	0.00	940	-0.650	0.066	-0.78	-0.52	1.21×10^{-6}
CGH AD	0.00	940	-0.617	0.066	-0.75	-0.49	3.45×10^{-6}

CST AD	0.00	940	-0.402	0.065	-0.53	-0.27	2.36×10^{-3}
SFO AD	0.40	940	0.103	0.065	-0.02	0.23	4.86×10^{-1}
SLF AD	0.00	940	-0.370	0.065	-0.50	-0.24	4.84×10^{-3}
SS AD	0.00	940	-0.596	0.066	-0.73	-0.47	6.07×10^{-6}
TAP AD	0.56	940	-0.070	0.065	-0.20	0.06	6.19×10^{-1}
UNC AD	0.00	940	-0.458	0.065	-0.59	-0.33	7.76×10^{-4}

1.4.6 AD: Stratification by HY Stage - Matched Control Samples

HY1 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	**p_{FDR}**
Entire WM AD	0.61	529	-0.044	0.09	-0.21	0.12	7.56×10^{-1}
ACR AD	0.89	529	-0.012	0.09	-0.18	0.16	8.92×10^{-1}
SCR AD	0.10	529	0.143	0.09	-0.02	0.31	4.42×10^{-1}
PCR AD	0.78	529	0.024	0.09	-0.14	0.19	8.59×10^{-1}
ALIC AD	0.26	529	-0.099	0.09	-0.27	0.07	6.52×10^{-1}
PLIC AD	0.85	529	0.016	0.09	-0.15	0.18	8.92×10^{-1}
RLIC AD	0.04	529	-0.176	0.09	-0.34	-0.01	3.43×10^{-1}
EC AD	0.61	529	-0.045	0.09	-0.21	0.12	7.56×10^{-1}
FX AD	0.62	529	-0.043	0.09	-0.21	0.12	7.56×10^{-1}
FXST AD	0.02	529	-0.208	0.09	-0.38	-0.04	3.43×10^{-1}
PTR AD	0.54	529	-0.053	0.09	-0.22	0.11	7.56×10^{-1}
GCC AD	0.33	529	-0.084	0.09	-0.25	0.08	7.36×10^{-1}
BCC AD	0.12	529	0.135	0.09	-0.03	0.30	4.42×10^{-1}
SCC AD	0.15	529	0.124	0.09	-0.04	0.29	4.85×10^{-1}
CGC AD	0.27	529	-0.097	0.09	-0.26	0.07	6.52×10^{-1}
CGH AD	0.05	529	-0.169	0.09	-0.34	0.00	3.43×10^{-1}
CST AD	0.62	529	-0.044	0.09	-0.21	0.12	7.56×10^{-1}
SFO AD	0.44	529	0.067	0.09	-0.10	0.23	7.56×10^{-1}
SLF AD	0.58	529	-0.048	0.09	-0.22	0.12	7.56×10^{-1}
SS AD	0.06	529	-0.162	0.09	-0.33	0.01	3.43×10^{-1}
TAP AD	0.58	529	0.048	0.09	-0.12	0.22	7.56×10^{-1}
UNC AD	0.72	529	-0.031	0.09	-0.20	0.14	8.39×10^{-1}

HY2 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	**p_{FDR}**
Entire WM AD	0.11	1463	-0.083	0.05	-0.18	0.02	2.80×10^{-1}

ACR AD	0.55	1463	-0.031	0.05	-0.13	0.07	6.34×10^{-1}
SCR AD	0.42	1463	0.042	0.05	-0.06	0.14	5.10×10^{-1}
PCR AD	0.98	1463	0.001	0.05	-0.10	0.10	9.83×10^{-1}
ALIC AD	0.00	1463	-0.179	0.05	-0.28	-0.08	3.48×10^{-3}
PLIC AD	0.06	1463	-0.099	0.05	-0.20	0.00	1.61×10^{-1}
RLIC AD	0.00	1463	-0.240	0.05	-0.34	-0.14	3.67×10^{-5}
EC AD	0.30	1463	-0.054	0.05	-0.16	0.05	4.22×10^{-1}
FX AD	0.21	1463	0.066	0.05	-0.04	0.17	3.90×10^{-1}
FXST AD	0.00	1463	-0.281	0.05	-0.38	-0.18	1.01×10^{-6}
PTR AD	0.03	1463	-0.113	0.05	-0.21	-0.01	9.65×10^{-2}
GCC AD	0.68	1463	-0.021	0.05	-0.12	0.08	7.53×10^{-1}
BCC AD	0.76	1463	0.016	0.05	-0.09	0.12	8.01×10^{-1}
SCC AD	0.34	1463	0.050	0.05	-0.05	0.15	4.42×10^{-1}
CGC AD	0.01	1463	-0.130	0.05	-0.23	-0.03	4.89×10^{-2}
CGH AD	0.00	1463	-0.287	0.05	-0.39	-0.18	1.01×10^{-6}
CST AD	0.20	1463	-0.067	0.05	-0.17	0.04	3.90×10^{-1}
SFO AD	0.31	1463	-0.053	0.05	-0.16	0.05	4.22×10^{-1}
SLF AD	0.29	1463	-0.056	0.05	-0.16	0.05	4.22×10^{-1}
SS AD	0.00	1463	-0.159	0.05	-0.26	-0.06	1.07×10^{-2}
TAP AD	0.26	1463	0.059	0.05	-0.04	0.16	4.22×10^{-1}
UNC AD	0.21	1463	-0.065	0.05	-0.17	0.04	3.90×10^{-1}

HY3 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM AD	0.09	420	-0.166	0.10	-0.35	0.02	2.49×10^{-1}
ACR AD	0.99	420	-0.001	0.10	-0.19	0.19	9.91×10^{-1}
SCR AD	0.97	420	-0.004	0.10	-0.19	0.18	9.91×10^{-1}
PCR AD	0.79	420	-0.027	0.10	-0.21	0.16	9.09×10^{-1}
ALIC AD	0.05	420	-0.192	0.10	-0.38	0.00	1.57×10^{-1}
PLIC AD	0.60	420	-0.052	0.10	-0.24	0.14	7.66×10^{-1}
RLIC AD	0.02	420	-0.221	0.10	-0.41	-0.03	1.07×10^{-1}
EC AD	0.18	420	-0.132	0.10	-0.32	0.06	3.87×10^{-1}
FX AD	0.32	420	0.098	0.10	-0.09	0.28	6.10×10^{-1}
FXST AD	0.02	420	-0.233	0.10	-0.42	-0.04	1.00×10^{-1}
PTR AD	0.01	420	-0.245	0.10	-0.43	-0.06	1.00×10^{-1}
GCC AD	0.39	420	-0.083	0.10	-0.27	0.10	6.67×10^{-1}

BCC AD	0.92	420	0.010	0.10	-0.18	0.20	9.91×10^{-1}
SCC AD	0.63	420	-0.048	0.10	-0.23	0.14	7.66×10^{-1}
CGC AD	0.03	420	-0.209	0.10	-0.40	-0.02	1.20×10^{-1}
CGH AD	0.00	420	-0.276	0.10	-0.46	-0.09	1.00×10^{-1}
CST AD	0.49	420	0.068	0.10	-0.12	0.26	6.69×10^{-1}
SFO AD	0.33	420	0.095	0.10	-0.09	0.28	6.10×10^{-1}
SLF AD	0.12	420	-0.151	0.10	-0.34	0.04	3.01×10^{-1}
SS AD	0.02	420	-0.231	0.10	-0.42	-0.04	1.00×10^{-1}
TAP AD	0.48	420	0.069	0.10	-0.12	0.26	6.69×10^{-1}
UNC AD	0.46	420	-0.072	0.10	-0.26	0.12	6.69×10^{-1}

HY4/5 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM AD	0.09	131	-0.297	0.17	-0.62	0.03	1.89×10^{-1}
ACR AD	0.89	131	0.024	0.16	-0.30	0.35	9.69×10^{-1}
SCR AD	0.42	131	0.142	0.16	-0.18	0.46	5.41×10^{-1}
PCR AD	0.93	131	-0.016	0.16	-0.34	0.31	9.69×10^{-1}
ALIC AD	0.41	131	-0.146	0.16	-0.47	0.18	5.41×10^{-1}
PLIC AD	0.38	131	-0.155	0.16	-0.48	0.17	5.41×10^{-1}
RLIC AD	0.05	131	-0.340	0.17	-0.66	-0.02	1.64×10^{-1}
EC AD	0.31	131	-0.178	0.16	-0.50	0.14	4.88×10^{-1}
FX AD	0.02	131	0.397	0.17	0.07	0.72	1.09×10^{-1}
FXST AD	0.07	131	-0.323	0.17	-0.65	0.00	1.64×10^{-1}
PTR AD	0.02	131	-0.411	0.17	-0.74	-0.09	1.09×10^{-1}
GCC AD	0.78	131	-0.049	0.16	-0.37	0.27	9.50×10^{-1}
BCC AD	0.24	131	-0.204	0.16	-0.53	0.12	4.14×10^{-1}
SCC AD	0.10	131	-0.289	0.17	-0.61	0.03	1.89×10^{-1}
CGC AD	0.01	131	-0.477	0.17	-0.80	-0.15	5.53×10^{-2}
CGH AD	0.00	131	-0.613	0.17	-0.94	-0.28	1.37×10^{-2}
CST AD	0.04	131	-0.370	0.17	-0.70	-0.05	1.32×10^{-1}
SFO AD	0.99	131	0.002	0.16	-0.32	0.32	9.89×10^{-1}
SLF AD	0.10	131	-0.287	0.17	-0.61	0.04	1.89×10^{-1}
SS AD	0.01	131	-0.474	0.17	-0.80	-0.15	5.53×10^{-2}
TAP AD	0.88	131	-0.027	0.16	-0.35	0.30	9.69×10^{-1}
UNC AD	0.06	131	-0.328	0.17	-0.65	0.00	1.64×10^{-1}

1.4.7 RD: Stratification by HY Stage

HY1 & Controls	*p*-value	Degrees of Freedom	Partial Cohen's *d*	Standard Error	Lower CI	Upper CI	p_{FDR}
Entire WM RD	0.00	1139	-0.218	0.059	-0.33	-0.10	1.38×10^{-1}
ACR RD	0.03	1139	-0.151	0.059	-0.27	-0.04	8.44×10^{-2}
SCR RD	0.24	1139	-0.082	0.059	-0.20	0.03	3.22×10^{-1}
PCR RD	0.22	1139	-0.086	0.059	-0.20	0.03	3.22×10^{-1}
ALIC RD	0.03	1139	-0.151	0.059	-0.27	-0.04	8.44×10^{-2}
PLIC RD	0.02	1139	-0.159	0.059	-0.27	-0.04	8.40×10^{-2}
RLIC RD	0.00	1139	-0.217	0.059	-0.33	-0.10	1.38×10^{-2}
EC RD	0.06	1139	-0.134	0.059	-0.25	-0.02	1.11×10^{-1}
FX RD	0.90	1139	-0.009	0.059	-0.12	0.11	9.00×10^{-1}
FXST RD	0.04	1139	-0.143	0.059	-0.26	-0.03	9.71×10^{-2}
PTR RD	0.08	1139	-0.120	0.059	-0.24	0.00	1.56×10^{-1}
GCC RD	0.02	1139	-0.159	0.059	-0.27	-0.04	8.40×10^{-2}
BCC RD	0.53	1139	-0.044	0.059	-0.16	0.07	5.54×10^{-1}
SCC RD	0.26	1139	-0.079	0.059	-0.19	0.04	3.22×10^{-1}
CGC RD	0.26	1139	-0.078	0.059	-0.19	0.04	3.22×10^{-1}
CGH RD	0.04	1139	-0.140	0.059	-0.26	-0.02	9.79×10^{-1}
CST RD	0.00	1139	-0.198	0.059	-0.31	-0.08	2.54×10^{-2}
SFO RD	0.35	1139	-0.065	0.059	-0.18	0.05	3.88×10^{-1}
SLF RD	0.16	1139	-0.099	0.059	-0.21	0.02	2.44×10^{-1}
SS RD	0.00	1139	-0.218	0.059	-0.33	-0.10	1.38×10^{-2}
TAP RD	0.29	1139	-0.073	0.059	-0.19	0.04	3.38×10^{-1}
UNC RD	0.10	1139	-0.114	0.059	-0.23	0.00	1.71×10^{-1}

HY2 & Controls	*p*-value	Degrees of Freedom	Partial Cohen's *d*	Standard Error	Lower CI	Upper CI	p_{FDR}
Entire WM RD	0.81	1606	0.012	0.050	-0.09	0.11	9.67×10^{-1}
ACR RD	0.55	1606	0.030	0.050	-0.07	0.13	9.67×10^{-1}
SCR RD	0.37	1606	-0.044	0.050	-0.14	0.05	7.82×10^{-1}
PCR RD	0.74	1606	0.017	0.050	-0.08	0.11	9.67×10^{-1}
ALIC RD	0.29	1606	-0.053	0.050	-0.15	0.04	7.82×10^{-1}
PLIC RD	0.03	1606	-0.110	0.050	-0.21	-0.01	2.57×10^{-1}
RLIC RD	0.04	1606	-0.106	0.050	-0.20	-0.01	2.57×10^{-1}
EC RD	0.74	1606	-0.016	0.050	-0.11	0.08	9.67×10^{-1}
FX RD	0.00	1606	0.188	0.050	0.09	0.29	4.09×10^{-3}

FXST RD	0.13	1606	-0.076	0.050	-0.17	0.02	7.25×10^{-1}
PTR RD	0.93	1606	-0.005	0.050	-0.10	0.09	9.67×10^{-1}
GCC RD	0.84	1606	0.010	0.050	-0.09	0.11	9.67×10^{-1}
BCC RD	0.62	1606	0.025	0.050	-0.07	0.12	9.67×10^{-1}
SCC RD	0.88	1606	-0.008	0.050	-0.10	0.09	9.67×10^{-1}
CGC RD	0.97	1606	0.002	0.050	-0.10	0.10	9.67×10^{-1}
CGH RD	0.27	1606	-0.055	0.050	-0.15	0.04	7.82×10^{-1}
CST RD	0.35	1606	-0.047	0.050	-0.14	0.05	7.82×10^{-1}
SFO RD	0.39	1606	-0.043	0.050	-0.14	0.05	7.82×10^{-1}
SLF RD	0.87	1606	-0.008	0.050	-0.11	0.09	9.67×10^{-1}
SS RD	0.37	1606	-0.045	0.050	-0.14	0.05	7.82×10^{-1}
TAP RD	0.63	1606	0.024	0.050	-0.07	0.12	9.67×10^{-1}
UNC RD	0.20	1606	0.064	0.050	-0.03	0.16	7.82×10^{-1}

HY3 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM RD	0.01	1085	0.195	0.060	0.08	0.31	4.64×10^{-2}
ACR RD	0.00	1085	0.289	0.061	0.17	0.41	3.33×10^{-3}
SCR RD	0.02	1085	0.174	0.060	0.06	0.29	7.07×10^{-2}
PCR RD	0.01	1085	0.200	0.060	0.08	0.32	4.64×10^{-2}
ALIC RD	0.38	1085	0.066	0.060	-0.05	0.18	4.43×10^{-1}
PLIC RD	0.29	1085	-0.080	0.060	-0.20	0.04	3.57×10^{-1}
RLIC RD	0.83	1085	0.016	0.060	-0.10	0.13	8.68×10^{-1}
EC RD	0.01	1085	0.186	0.060	0.07	0.30	5.29×10^{-2}
FX RD	0.00	1085	0.271	0.060	0.15	0.39	4.16×10^{-3}
FXST RD	0.05	1085	0.150	0.060	0.03	0.27	9.17×10^{-2}
PTR RD	0.09	1085	0.130	0.060	0.01	0.25	1.38×10^{-1}
GCC RD	0.05	1085	0.150	0.060	0.03	0.27	9.17×10^{-2}
BCC RD	0.15	1085	0.110	0.060	-0.01	0.23	2.18×10^{-1}
SCC RD	0.23	1085	0.091	0.060	-0.03	0.21	3.17×10^{-1}
CGC RD	0.25	1085	0.087	0.060	-0.03	0.20	3.29×10^{-1}
CGH RD	0.69	1085	-0.030	0.060	-0.15	0.09	7.63×10^{-1}
CST RD	0.88	1085	-0.012	0.060	-0.13	0.11	8.76×10^{-1}
SFO RD	0.03	1085	0.169	0.060	0.05	0.29	7.28×10^{-2}
SLF RD	0.01	1085	0.195	0.060	0.08	0.31	4.64×10^{-2}
SS RD	0.04	1085	0.160	0.060	0.04	0.28	8.63×10^{-2}

TAP RD	0.08	1085	0.132	0.060	0.01	0.25	1.38×10^{-1}
UNC RD	0.05	1085	0.149	0.060	0.03	0.27	9.17×10^{-2}

HY4/5 & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM RD	0.00	940	0.576	0.066	0.45	0.70	9.25×10^{-6}
ACR RD	0.00	940	0.545	0.066	0.42	0.67	2.62×10^{-5}
SCR RD	0.00	940	0.488	0.066	0.36	0.62	1.75×10^{-4}
PCR RD	0.00	940	0.356	0.065	0.23	0.48	5.08×10^{-3}
ALIC RD	0.00	940	0.397	0.065	0.27	0.52	2.00×10^{-3}
PLIC RD	0.77	940	0.036	0.065	-0.09	0.16	8.34×10^{-1}
RLIC RD	0.88	940	0.018	0.065	-0.11	0.14	8.83×10^{-1}
EC RD	0.00	940	0.587	0.066	0.46	0.72	8.78×10^{-6}
FX RD	0.00	940	0.778	0.067	0.65	0.91	5.36×10^{-9}
FXST RD	0.00	940	0.441	0.065	0.31	0.57	6.69×10^{-4}
PTR RD	0.01	940	0.318	0.065	0.19	0.45	1.16×10^{-2}
GCC RD	0.00	940	0.638	0.066	0.51	0.77	1.39×10^{-6}
BCC RD	0.00	940	0.577	0.066	0.45	0.71	9.25×10^{-6}
SCC RD	0.00	940	0.395	0.065	0.27	0.52	2.00×10^{-3}
CGC RD	0.00	940	0.437	0.065	0.31	0.57	6.76×10^{-4}
CGH RD	0.80	940	0.031	0.065	-0.10	0.16	8.34×10^{-1}
CST RD	0.74	940	0.040	0.065	-0.09	0.17	8.34×10^{-1}
SFO RD	0.00	940	0.651	0.066	0.52	0.78	1.20×10^{-6}
SLF RD	0.00	940	0.378	0.065	0.25	0.51	3.03×10^{-3}
SS RD	0.17	940	0.167	0.065	0.04	0.29	2.07×10^{-1}
TAP RD	0.01	940	0.324	0.065	0.20	0.45	1.06×10^{-2}
UNC RD	0.00	940	0.462	0.065	0.33	0.59	3.71×10^{-4}

1.4.8 RD: Stratification by HY Stage - Matched Control Samples

HY1 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM RD	0.08	529	-0.150	0.09	-0.32	0.02	3.71×10^{-1}
ACR RD	0.31	529	-0.088	0.09	-0.26	0.08	6.20×10^{-1}
SCR RD	0.18	529	-0.117	0.09	-0.28	0.05	4.96×10^{-1}
PCR RD	0.40	529	-0.074	0.09	-0.24	0.09	6.20×10^{-1}
ALIC RD	0.06	529	-0.167	0.09	-0.33	0.00	3.04×10^{-1}

PLIC RD	0.03	529	-0.186	0.09	-0.35	-0.02	2.41×10^{-1}
RLIC RD	0.03	529	-0.189	0.09	-0.36	-0.02	2.41×10^{-1}
EC RD	0.17	529	-0.120	0.09	-0.29	0.05	4.96×10^{-1}
FX RD	0.34	529	0.083	0.09	-0.08	0.25	6.20×10^{-1}
FXST RD	0.49	529	-0.060	0.09	-0.23	0.11	6.37×10^{-1}
PTR RD	0.41	529	-0.072	0.09	-0.24	0.10	6.20×10^{-1}
GCC RD	0.23	529	-0.105	0.09	-0.27	0.06	5.56×10^{-1}
BCC RD	0.88	529	-0.013	0.09	-0.18	0.15	9.24×10^{-1}
SCC RD	0.93	529	-0.008	0.09	-0.18	0.16	9.31×10^{-1}
CGC RD	0.83	529	-0.019	0.09	-0.19	0.15	9.10×10^{-1}
CGH RD	0.42	529	-0.070	0.09	-0.24	0.10	6.20×10^{-1}
CST RD	0.12	529	-0.135	0.09	-0.30	0.03	4.45×10^{-1}
SFO RD	0.76	529	-0.027	0.09	-0.19	0.14	8.76×10^{-1}
SLF RD	0.57	529	-0.050	0.09	-0.22	0.12	6.93×10^{-1}
SS RD	0.03	529	-0.193	0.09	-0.36	-0.03	2.41×10^{-1}
TAP RD	0.38	529	-0.076	0.09	-0.24	0.09	6.20×10^{-1}
UNC RD	0.48	529	-0.062	0.09	-0.23	0.11	6.37×10^{-1}

HY2 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM RD	0.69	1463	0.021	0.05	-0.08	0.12	9.36×10^{-1}
ACR RD	0.50	1463	0.035	0.05	-0.07	0.14	7.93×10^{-1}
SCR RD	0.41	1463	-0.043	0.05	-0.14	0.06	7.93×10^{-1}
PCR RD	0.57	1463	0.030	0.05	-0.07	0.13	8.37×10^{-1}
ALIC RD	0.37	1463	-0.047	0.05	-0.15	0.05	7.93×10^{-1}
PLIC RD	0.02	1463	-0.118	0.05	-0.22	-0.02	2.67×10^{-1}
RLIC RD	0.07	1463	-0.094	0.05	-0.20	0.01	5.41×10^{-1}
EC RD	0.73	1463	-0.018	0.05	-0.12	0.08	9.36×10^{-1}
FX RD	0.00	1463	0.192	0.05	0.09	0.29	5.49×10^{-3}
FXST RD	0.16	1463	-0.073	0.05	-0.17	0.03	7.93×10^{-1}
PTR RD	0.81	1463	0.013	0.05	-0.09	0.11	9.36×10^{-1}
GCC RD	0.80	1463	0.013	0.05	-0.09	0.12	9.36×10^{-1}
BCC RD	0.45	1463	0.039	0.05	-0.06	0.14	7.93×10^{-1}
SCC RD	1.00	1463	0.000	0.05	-0.10	0.10	9.98×10^{-1}
CGC RD	0.87	1463	0.009	0.05	-0.09	0.11	9.53×10^{-1}
CGH RD	0.32	1463	-0.052	0.05	-0.15	0.05	7.93×10^{-1}

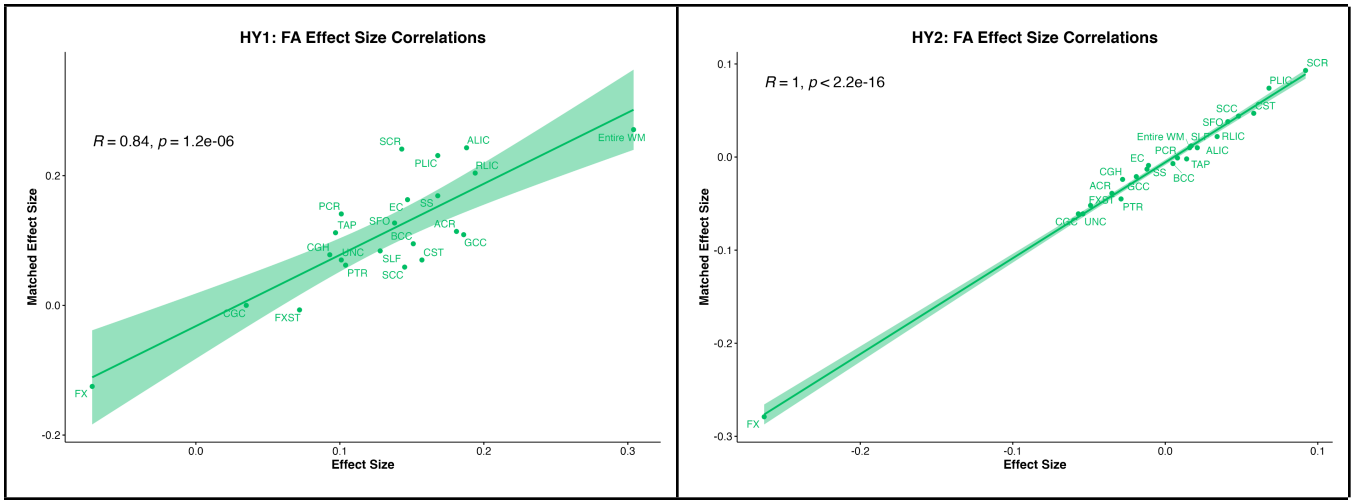
CST RD	0.44	1463	-0.041	0.05	-0.14	0.06	7.93×10^{-1}
SFO RD	0.50	1463	-0.036	0.05	-0.14	0.07	7.93×10^{-1}
SLF RD	1.00	1463	0.000	0.05	-0.10	0.10	9.98×10^{-1}
SS RD	0.44	1463	-0.040	0.05	-0.14	0.06	7.93×10^{-1}
TAP RD	0.37	1463	0.046	0.05	-0.06	0.15	7.93×10^{-1}
UNC RD	0.19	1463	0.069	0.05	-0.03	0.17	7.93×10^{-1}

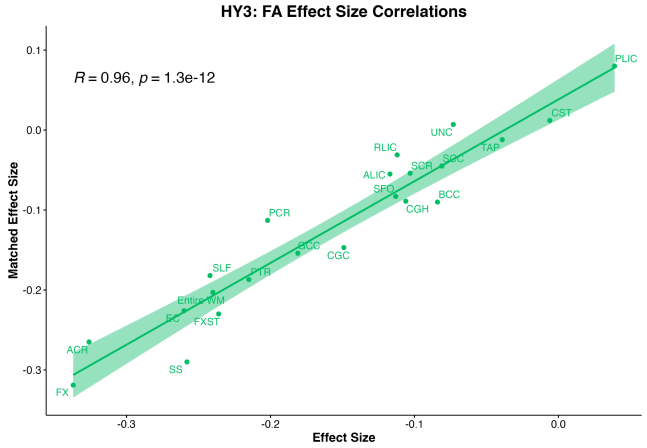
HY3 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM RD	0.14	420	0.143	0.10	-0.04	0.33	5.93×10^{-1}
ACR RD	0.03	420	0.219	0.10	0.03	0.41	2.80×10^{-1}
SCR RD	0.39	420	0.083	0.10	-0.10	0.27	6.16×10^{-1}
PCR RD	0.32	420	0.097	0.10	-0.09	0.28	6.16×10^{-1}
ALIC RD	0.89	420	-0.013	0.10	-0.20	0.17	9.37×10^{-1}
PLIC RD	0.15	420	-0.139	0.10	-0.33	0.05	5.93×10^{-1}
RLIC RD	0.42	420	-0.079	0.10	-0.27	0.11	6.16×10^{-1}
EC RD	0.25	420	0.112	0.10	-0.08	0.30	6.15×10^{-1}
FX RD	0.01	420	0.264	0.10	0.08	0.45	1.57×10^{-1}
FXST RD	0.35	420	0.091	0.10	-0.10	0.28	6.16×10^{-1}
PTR RD	0.50	420	0.066	0.10	-0.12	0.25	6.17×10^{-1}
GCC RD	0.22	420	0.121	0.10	-0.07	0.31	5.93×10^{-1}
BCC RD	0.30	420	0.102	0.10	-0.09	0.29	6.16×10^{-1}
SCC RD	0.58	420	0.054	0.10	-0.13	0.24	6.60×10^{-1}
CGC RD	0.49	420	0.067	0.10	-0.12	0.25	6.17×10^{-1}
CGH RD	0.42	420	-0.079	0.10	-0.27	0.11	6.16×10^{-1}
CST RD	0.95	420	-0.006	0.10	-0.19	0.18	9.54×10^{-1}
SFO RD	0.18	420	0.131	0.10	-0.06	0.32	5.93×10^{-1}
SLF RD	0.21	420	0.122	0.10	-0.07	0.31	5.93×10^{-1}
SS RD	0.19	420	0.129	0.10	-0.06	0.32	5.93×10^{-1}
TAP RD	0.51	420	0.065	0.10	-0.12	0.25	6.17×10^{-1}
UNC RD	0.60	420	0.051	0.10	-0.14	0.24	6.60×10^{-1}

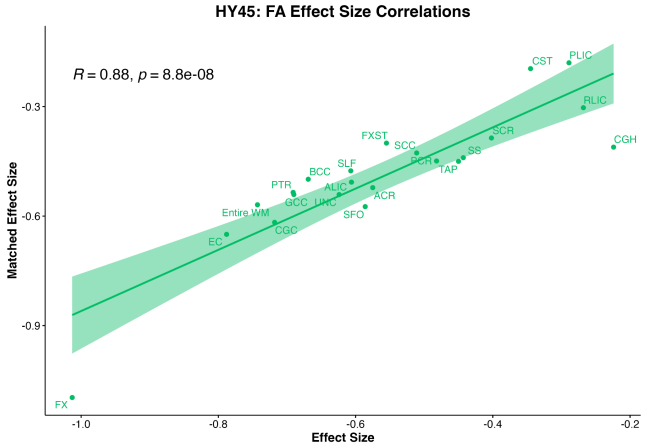
HY4/5 & Matched Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM RD	0.01	131	0.448	0.17	0.12	0.77	3.63×10^{-2}

ACR RD	0.01	131	0.471	0.17	0.14	0.80	3.58×10^{-2}
SCR RD	0.01	131	0.449	0.17	0.12	0.78	3.63×10^{-2}
PCR RD	0.04	131	0.362	0.17	0.04	0.69	8.05×10^{-2}
ALIC RD	0.04	131	0.364	0.17	0.04	0.69	8.05×10^{-2}
PLIC RD	0.96	131	0.008	0.16	-0.31	0.33	9.61×10^{-1}
RLIC RD	0.83	131	0.037	0.16	-0.29	0.36	8.73×10^{-1}
EC RD	0.01	131	0.470	0.17	0.14	0.80	3.58×10^{-2}
FX RD	0.00	131	0.852	0.17	0.52	1.19	6.80×10^{-5}
FXST RD	0.08	131	0.304	0.17	-0.02	0.63	1.16×10^{-1}
PTR RD	0.09	131	0.294	0.17	-0.03	0.62	1.23×10^{-1}
GCC RD	0.00	131	0.558	0.17	0.23	0.89	1.94×10^{-2}
BCC RD	0.02	131	0.423	0.17	0.10	0.75	4.27×10^{-2}
SCC RD	0.05	131	0.344	0.17	0.02	0.67	8.66×10^{-1}
CGC RD	0.02	131	0.421	0.17	0.09	0.75	4.27×10^{-2}
CGH RD	0.44	131	0.135	0.16	-0.19	0.46	5.10×10^{-1}
CST RD	0.57	131	-0.101	0.16	-0.42	0.22	6.23×10^{-1}
SFO RD	0.01	131	0.493	0.17	0.17	0.82	3.58×10^{-2}
SLF RD	0.06	131	0.326	0.17	0.00	0.65	9.45×10^{-2}
SS RD	0.39	131	0.150	0.16	-0.17	0.47	4.79×10^{-1}
TAP RD	0.05	131	0.344	0.17	0.02	0.67	8.66×10^{-2}
UNC RD	0.06	131	0.335	0.17	0.01	0.66	8.99×10^{-2}

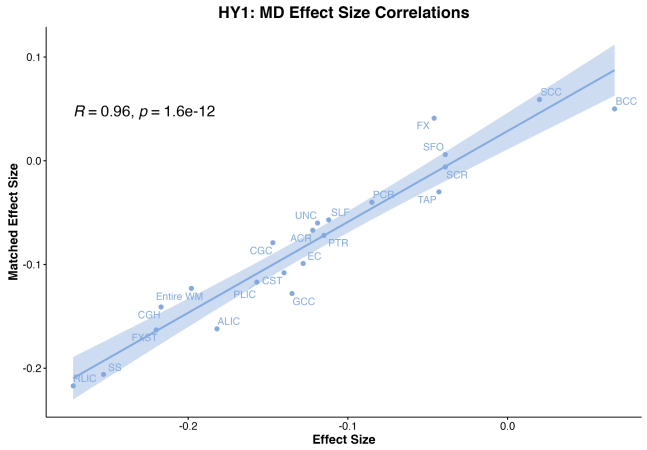
1.5 Associations between effect sizes

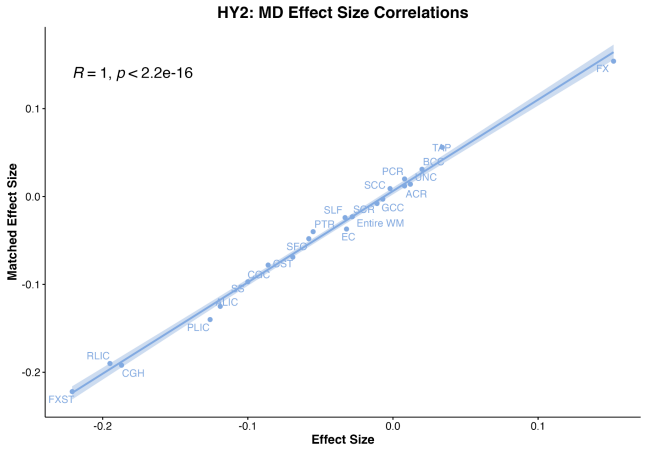


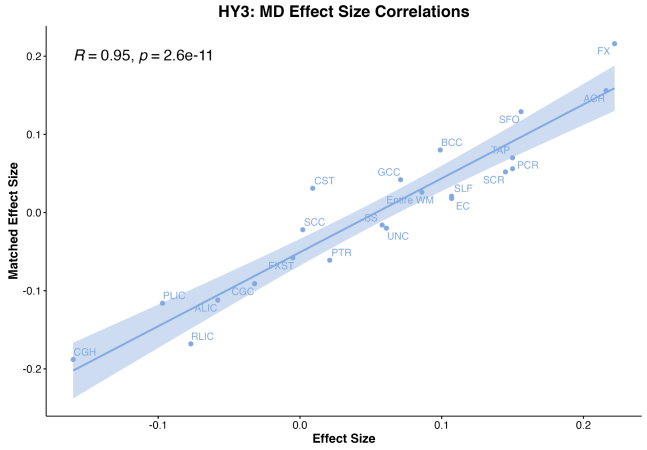


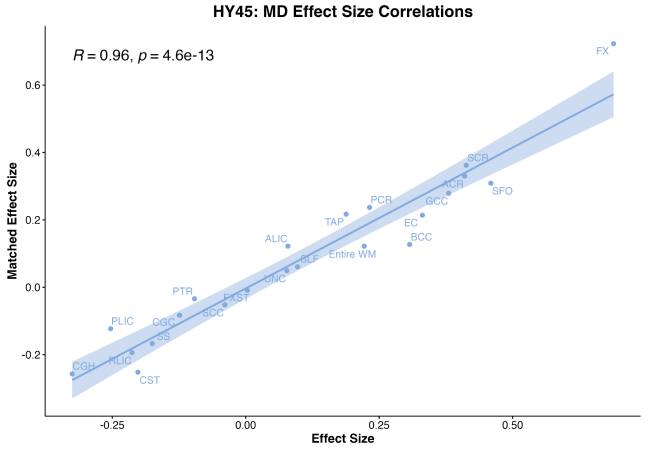


Supplementary Figure 1: Correlations between effect sizes generated when comparing FA between PD HY subgroups and Controls versus comparing data to matched Control participants. Abbreviations: CR/ACR/PCR/SCR, corona radiata (anterior/posterior/superior); IC/ALIC/PLIC/RLIC, internal capsule (anterior/posterior/retrolenticular limb); EC, external capsule; PTR, posterior thalamic radiation; CC/BCC/GCC/SCC, corpus callosum (body/genu/splenium); CGC, cingulum (cingulate gyrus part); CGH, cingulum (hippocampal portion); CST, corticospinal tract; SFO, superior fronto-occipital fasciculus; SLF, superior longitudinal fasciculus; SS, sagittal stratum; TAP, tapetum; UNC, uncinate fasciculus; FXST, fornix/*stria terminalis.*

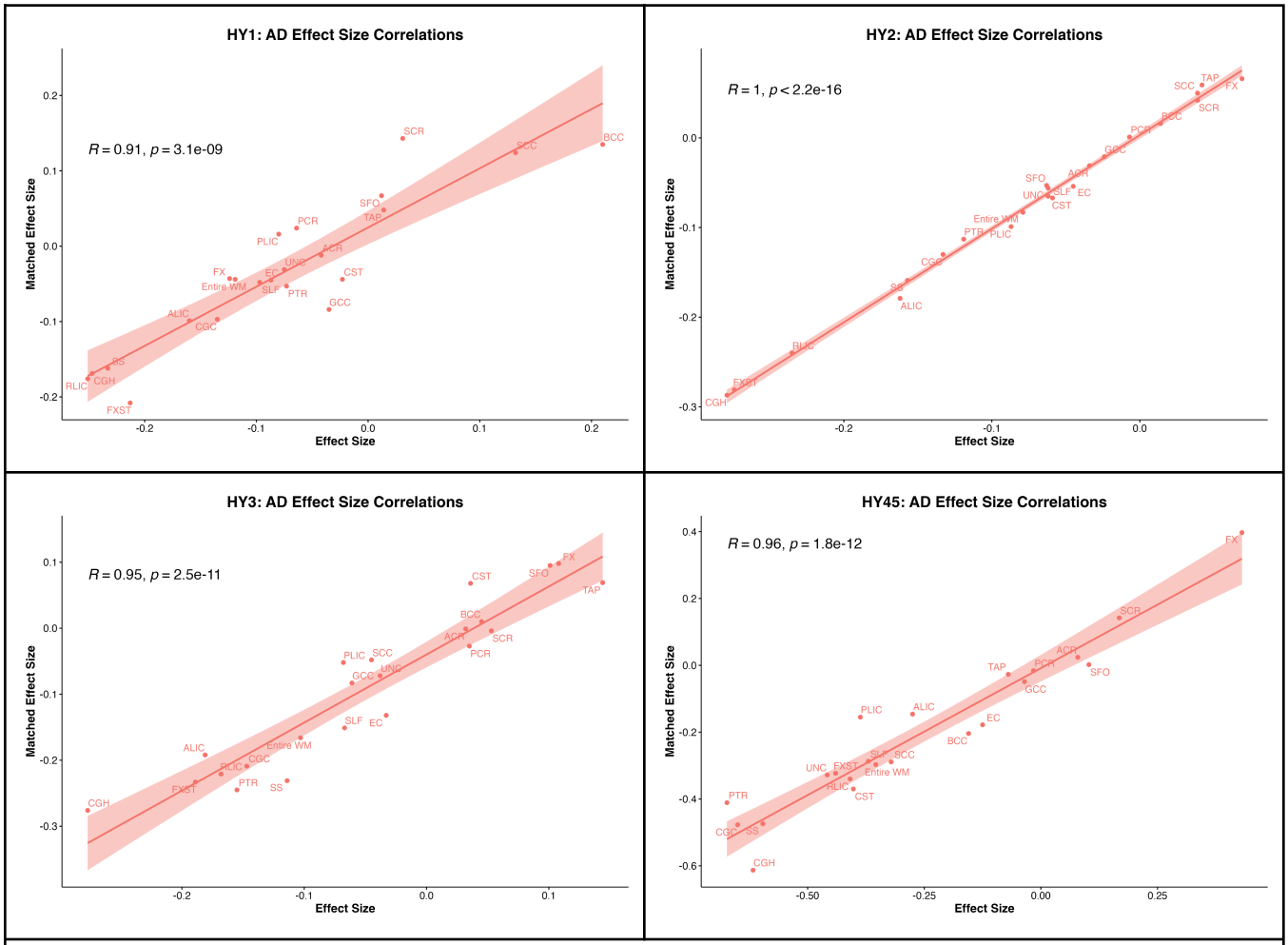




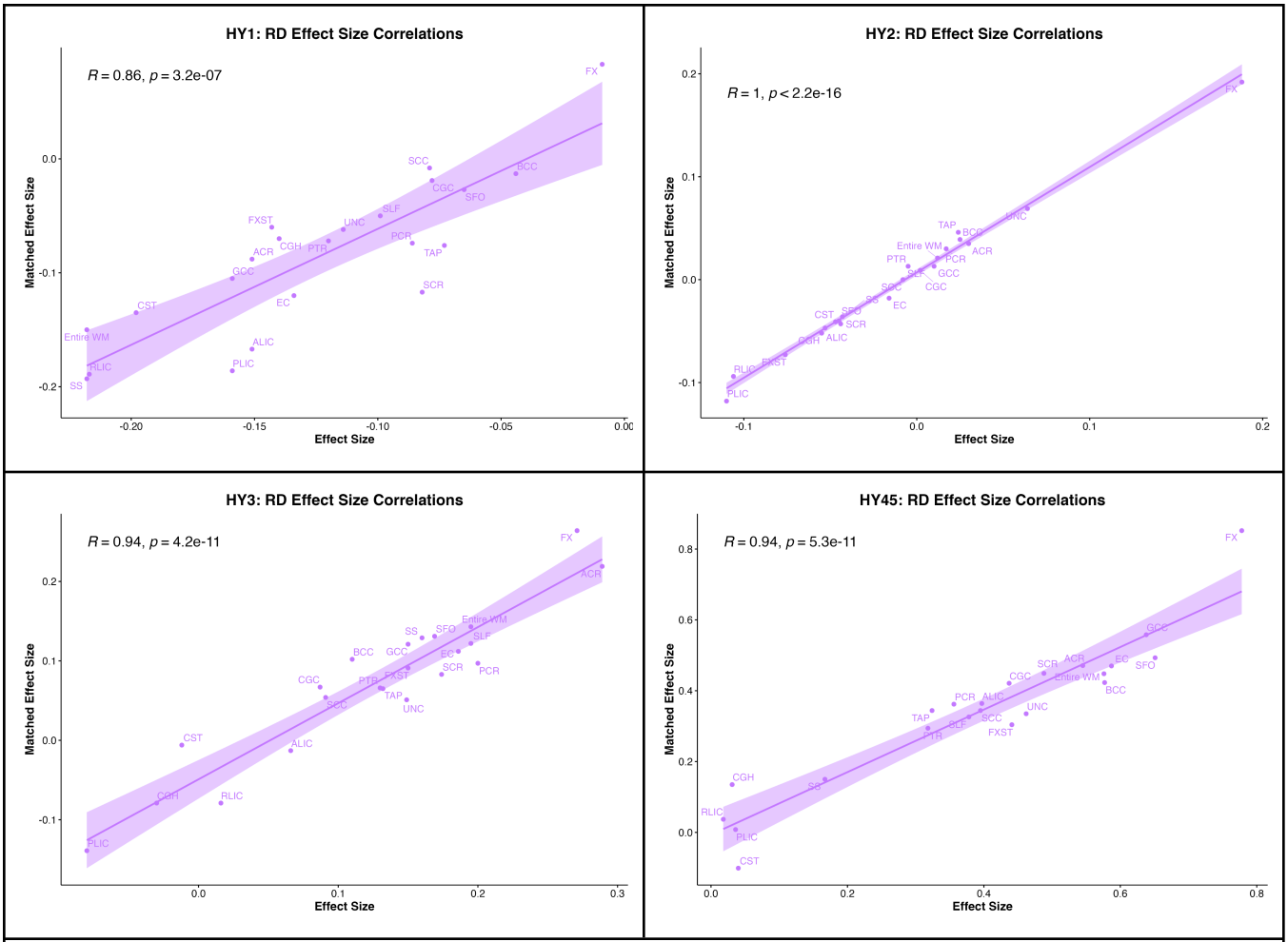




Supplementary Figure 2: Correlations between effect sizes generated when comparing MD between PD HY subgroups and Controls versus comparing data to matched Control participants. Abbreviations: CR/ACR/PCR/SCR, corona radiata (anterior/posterior/superior); IC/ALIC/PLIC/RLIC, internal capsule (anterior/posterior/retrolenticular limb); EC, external capsule; PTR, posterior thalamic radiation; CC/BCC/GCC/SCC, corpus callosum (body/genu/splenium); CGC, cingulum (cingulate gyrus part); CGH, cingulum (hippocampal portion); CST, corticospinal tract; SFO, superior fronto-occipital fasciculus; SLF, superior longitudinal fasciculus; SS, sagittal stratum; TAP, tapetum; UNC, uncinate fasciculus; FXST, fornix/stria-terminalis;

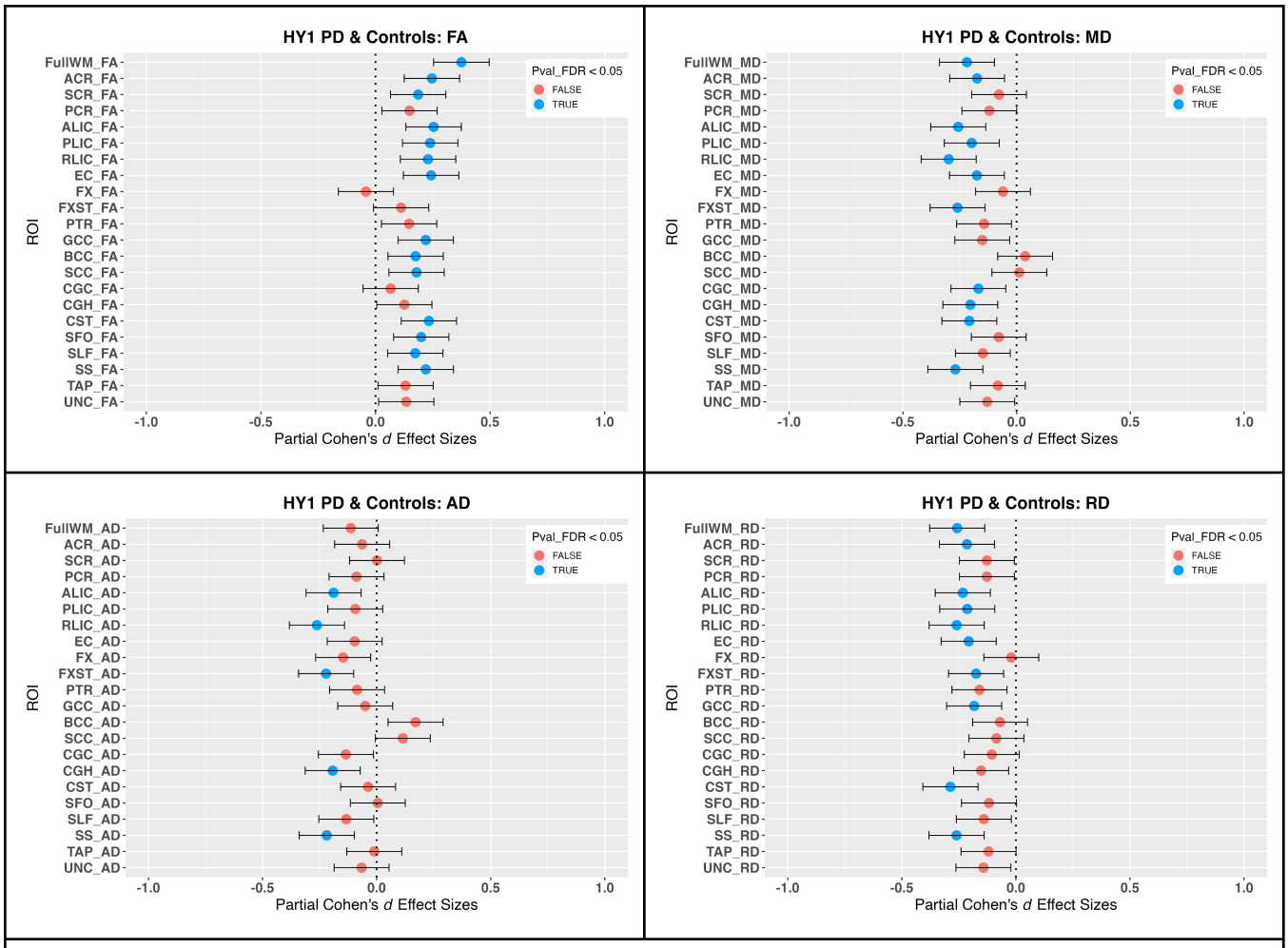


Supplementary Figure 3: Correlations between effect sizes generated when comparing AD between PD HY subgroups and Controls versus comparing data to matched Control groups. Abbreviations: CR/ACR/PCR/SCR, corona radiata (anterior/posterior/superior); IC/ALIC/PLIC/RLIC, internal capsule (anterior/posterior/retrolenticular limb); EC, external capsule; PTR, posterior thalamic radiation; CC/BCC/GCC/SCC, corpus callosum (body/genu/splenium); CGC, cingulum (cingulate gyrus part); CGH, cingulum (hippocampal portion); CST, corticospinal tract; SFO, superior fronto-occipital fasciculus; SLF, superior longitudinal fasciculus; SS, sagittal stratum; TAP, tapetum; UNC, uncinate fasciculus; FXST, fornix/stria-terminalis;

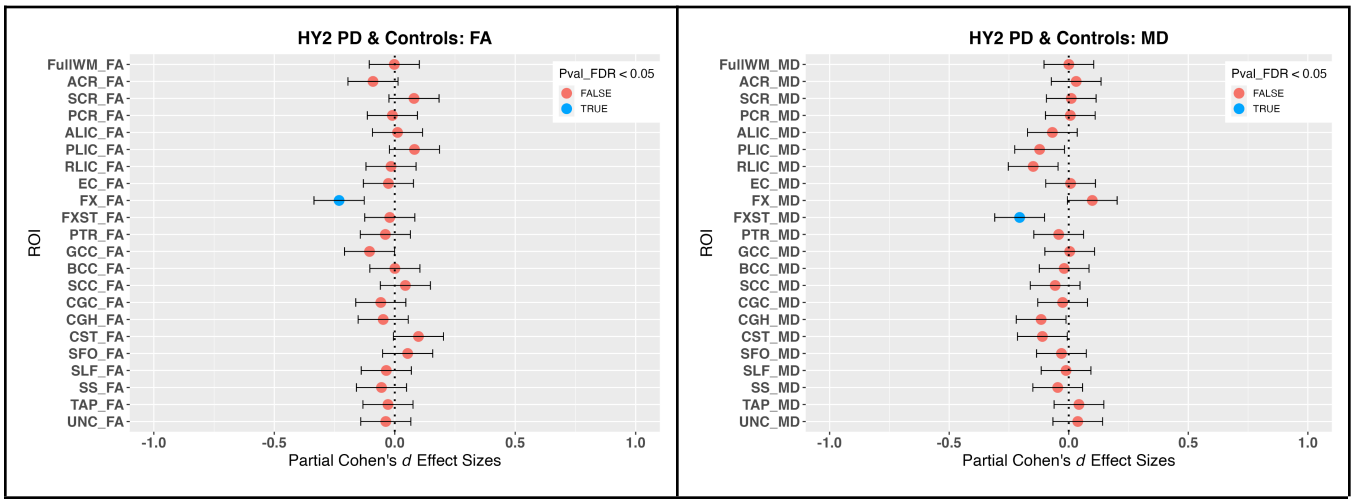


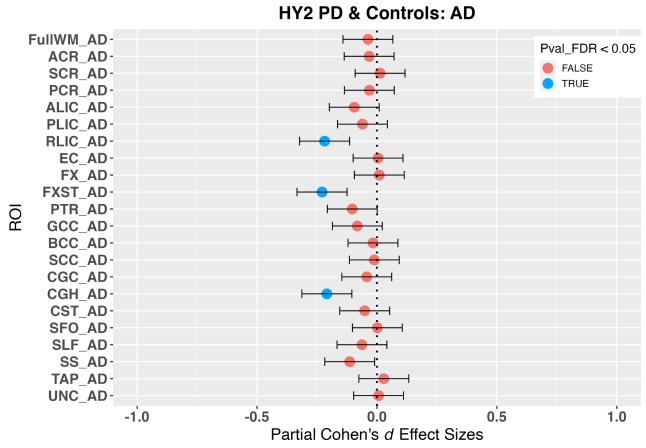
Supplementary Figure 4: Correlations between effect sizes generated when comparing RD between PD HY subgroups and Controls versus comparing data to matched Control groups. Abbreviations: CR/ACR/PCR/SCR, corona radiata (anterior/posterior/superior); IC/ALIC/PLIC/RLIC, internal capsule (anterior/posterior/retrolenticular limb); EC, external capsule; PTR, posterior thalamic radiation; CC/BCC/GCC/SCC, corpus callosum (body/genu/splenium); CGC, cingulum (cingulate gyrus part); CGH, cingulum (hippocampal portion); CST, corticospinal tract; SFO, superior fronto-occipital fasciculus; SLF, superior longitudinal fasciculus; SS, sagittal stratum; TAP, tapetum; UNC, uncinate fasciculus; FXST, fornix/stria-terminalis;

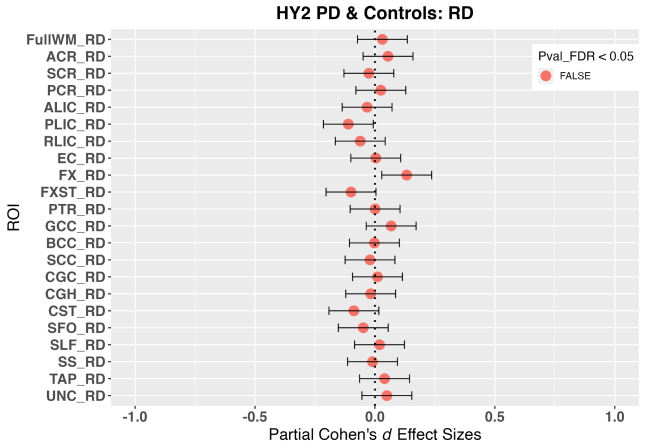
1.6 Between-group differences in DTI metrics after ComBat Harmonization - Stratification by HY Stage



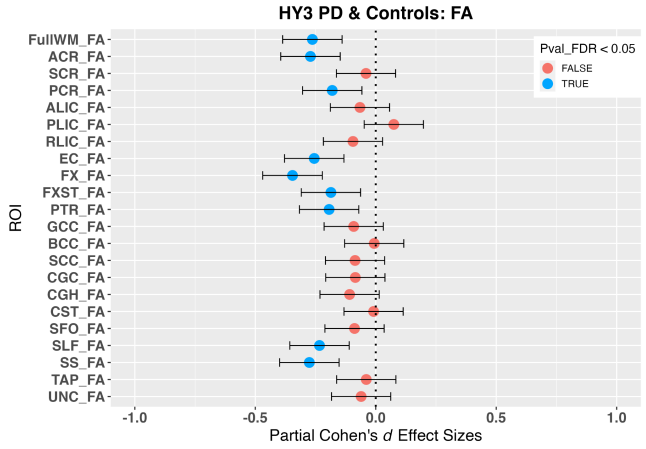
Supplementary Figure 5: **Results of linear models run on ComBat-harmonized data for HY1 PD participants.** Cohen's *d* effect sizes (and standard error bars) presented with associated FDR corrected *p*-values. Negative effect sizes indicate reduced value in PD participants. Subjects included HY1 participants and all controls.

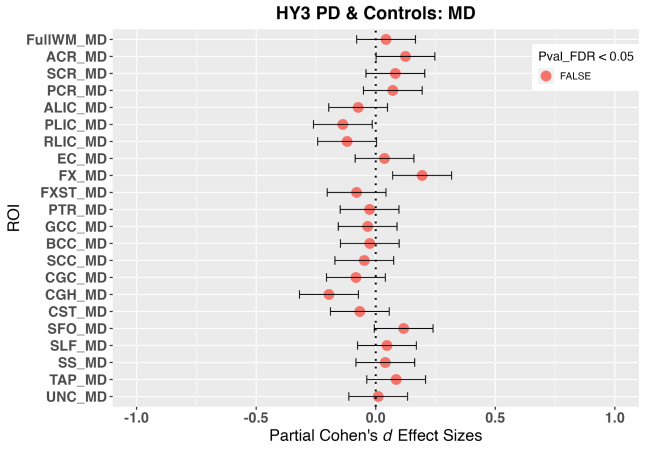


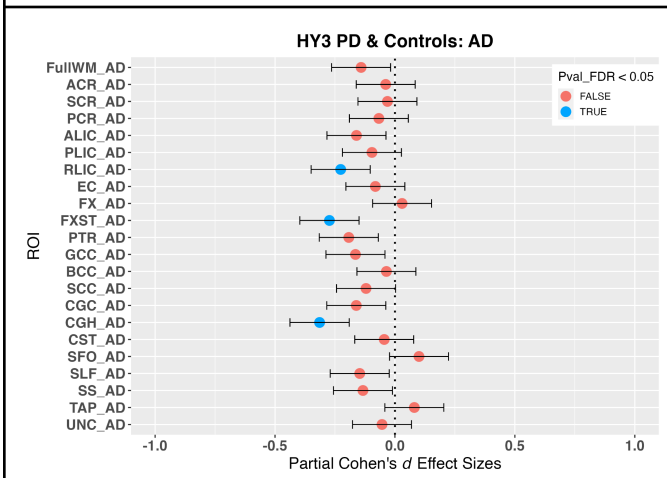


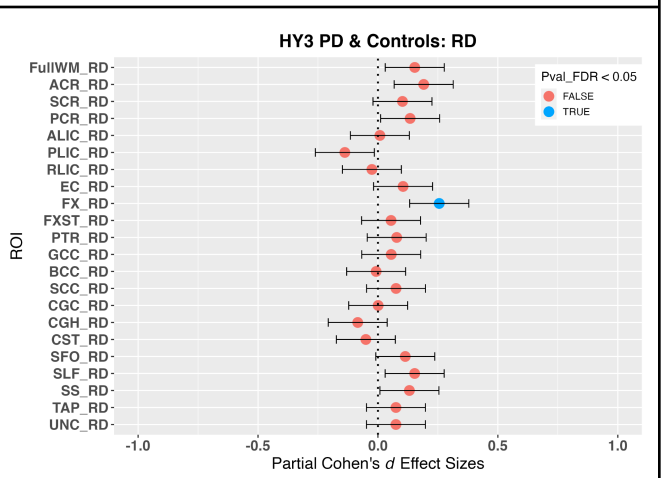


Supplementary Figure 6: **Results of linear models run on ComBat-harmonized data for HY2 PD participants**. Cohen's *d* effect sizes (and standard error bars) presented with associated FDR corrected *p*-values. Negative effect sizes indicate reduced value in PD participants. Subjects included HY2 participants and all controls.

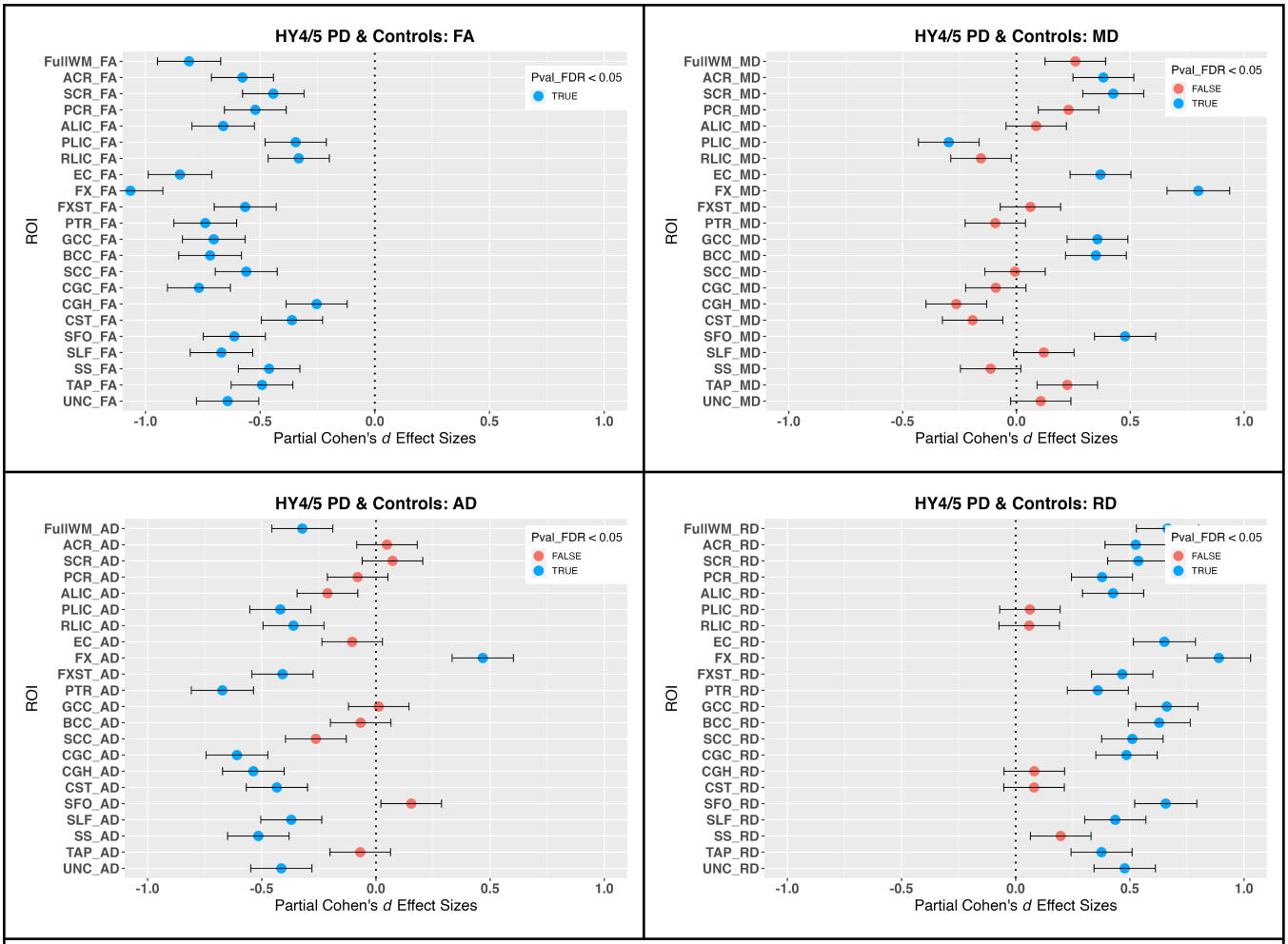






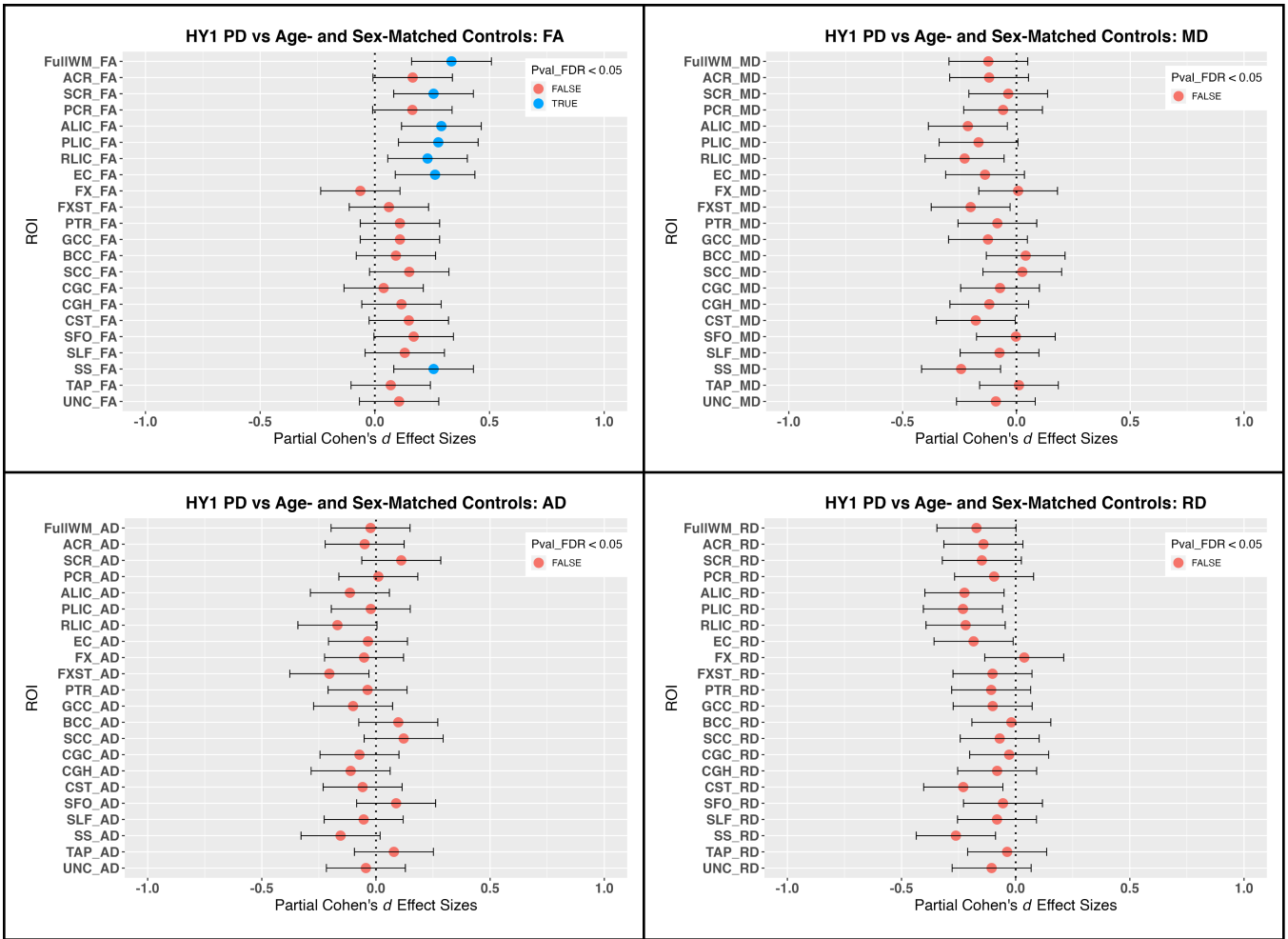


Supplementary Figure 7: **Results of linear models run on ComBat-harmonized data for HY3 PD participants**. Cohen's *d* effect sizes (and standard error bars) presented with associated FDR corrected *p*-values. Negative effect sizes indicate reduced value in PD participants. Subjects included HY3 participants and all controls.

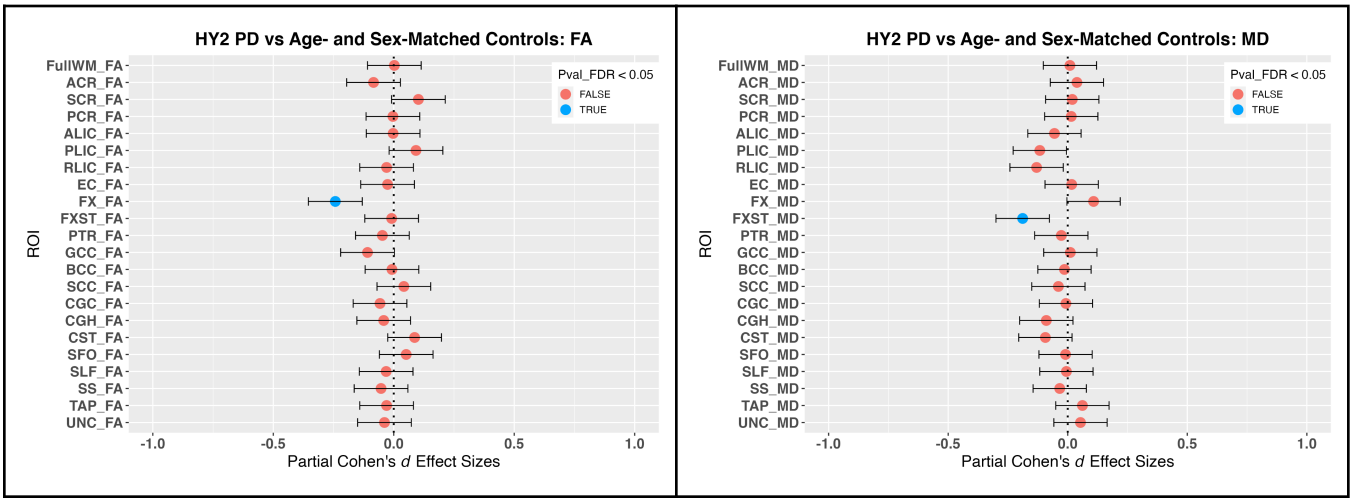


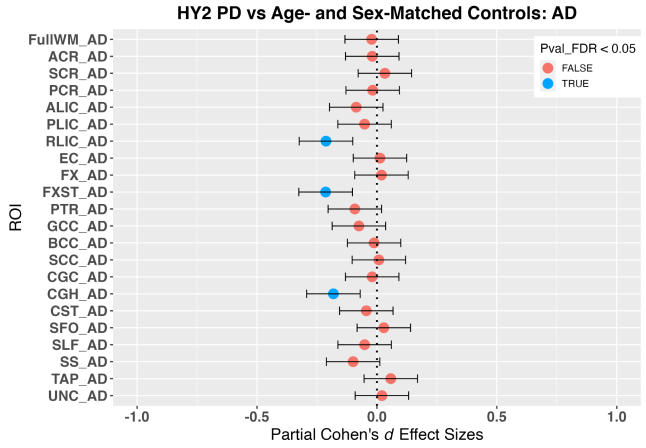
Supplementary Figure 8: **Results of linear models run on ComBat-harmonized data for HY4/5 PD participants**. Cohen's *d* effect sizes (and standard error bars) presented with associated FDR corrected *p*-values. Negative effect sizes indicate reduced value in PD participants. Subjects included HY4/5 participants and all controls.

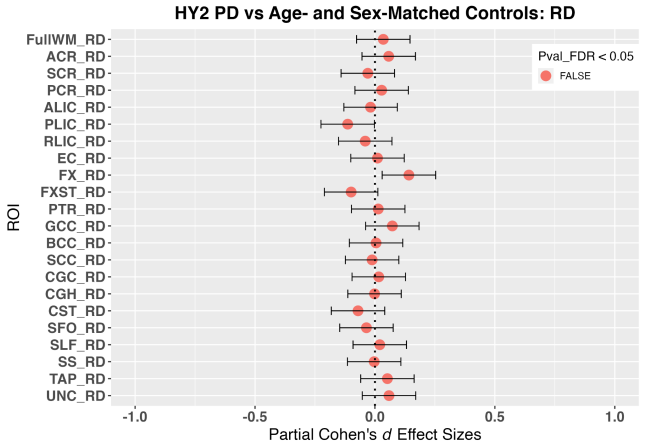
1.7 Between-group differences in DTI metrics after ComBat Harmonization - Stratification by HY Stage with Age- and Sex-Matched Controls



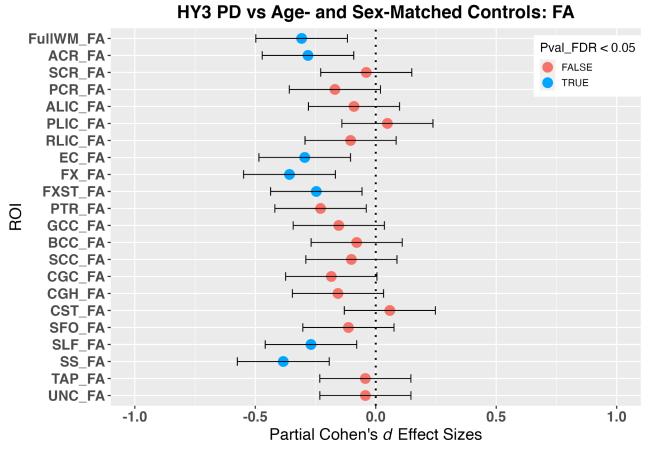
Supplementary Figure 9: **Results of linear models run on ComBat-harmonized data for HY1 PD participants and age- and sex-matched controls**. Cohen's *d* effect sizes (and standard error bars) presented with associated FDR corrected *p*-values. Negative effect sizes indicate reduced value in PD participants.

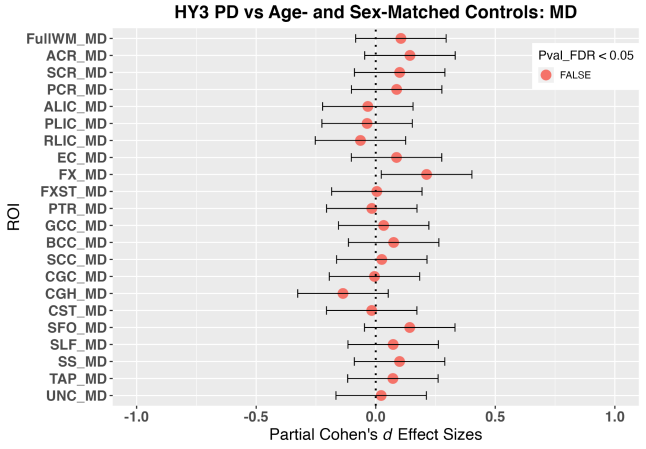


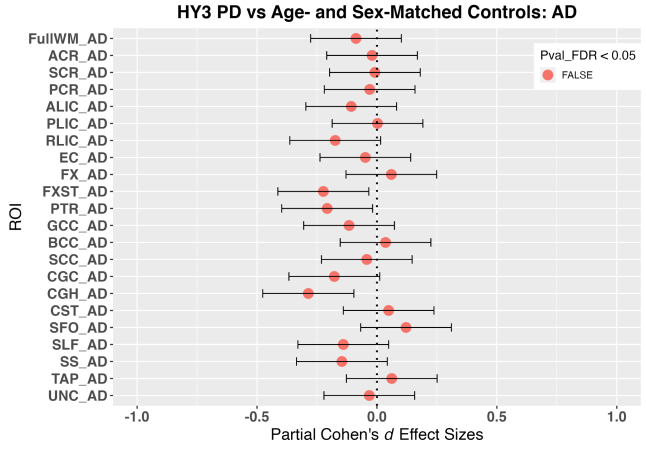


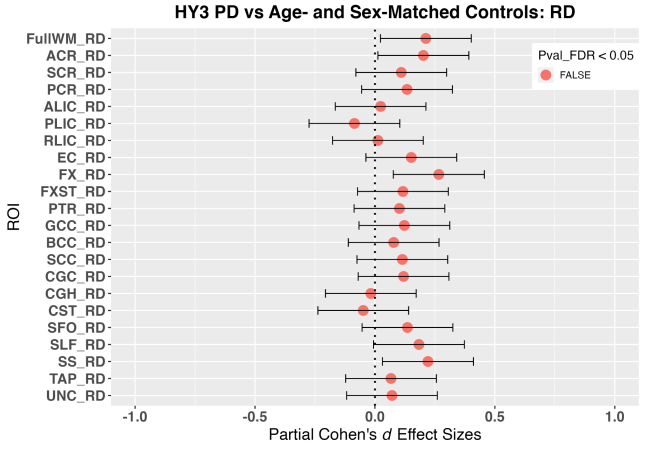


Supplementary Figure 10: Results of linear models run on ComBat-harmonized data for HY2 PD participants and age- and sex-matched controls. Cohen's *d* effect sizes (and standard error bars) presented with associated FDR corrected *p*-values. Negative effect sizes indicate reduced value in PD participants. Subjects included HY2 participants and age- and sex-matched controls.



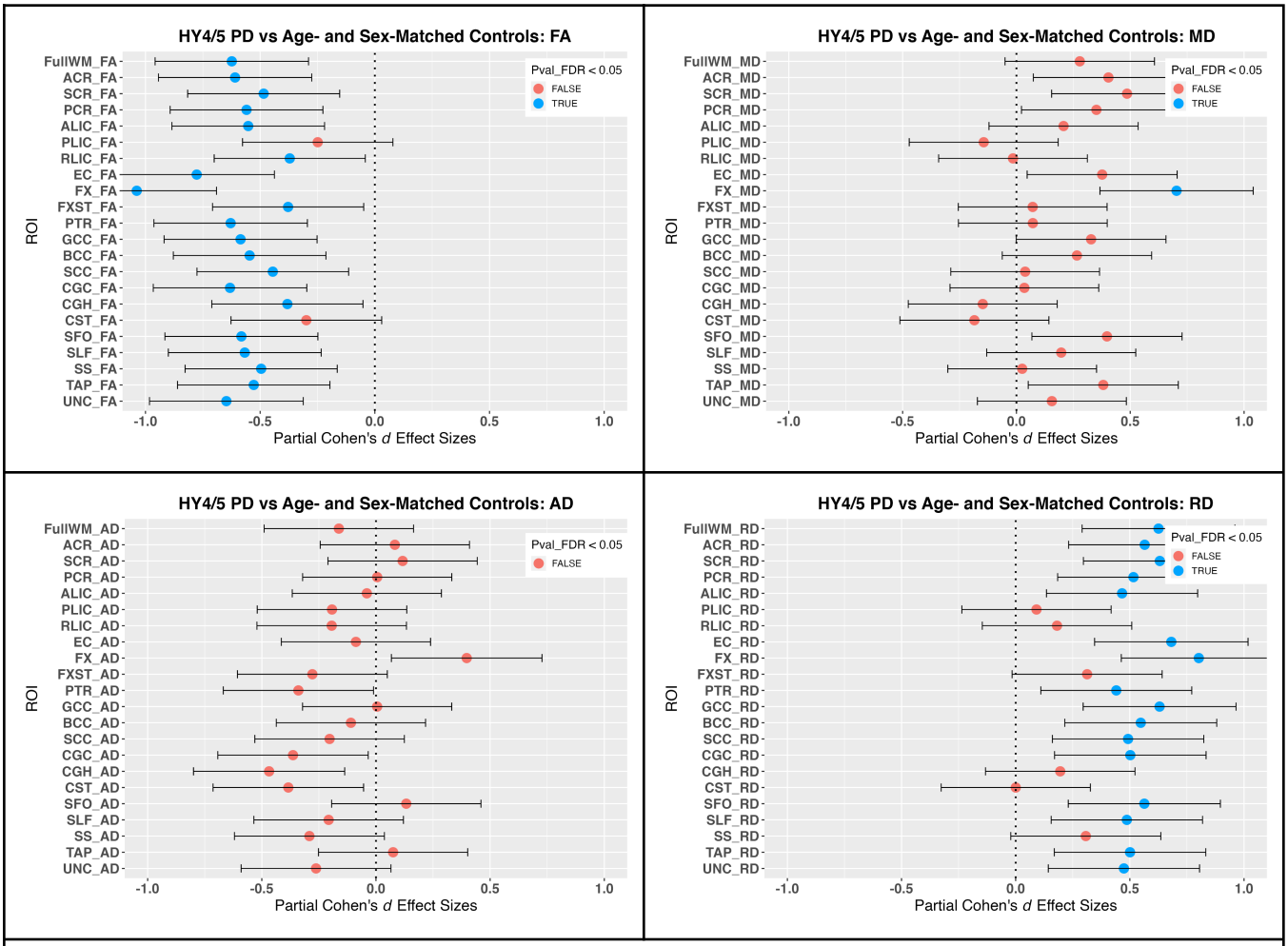






Supplementary Figure 11: Results of linear models run on ComBat-harmonized data for HY3 PD participants and age- and sex-matched controls. Cohen's *d* effect sizes (and standard error bars) presented

with associated FDR corrected *p*-values. Negative effect sizes indicate reduced value in PD participants. Subjects included HY3 participants and age- and sex-matched controls.



Supplementary Figure 12: Results of linear models run on ComBat-harmonized data for HY4/5 PD participants and age- and sex-matched controls. Cohen's *d* effect sizes (and standard error bars) presented with associated FDR corrected *p*-values. Negative effect sizes indicate reduced value in PD participants. Subjects included HY4/5 participants and age- and sex-matched controls.

	Validation Analysis #1				Validation Analysis #2			
ROI	**HY1**	**HY2**	**HY3**	**HY4/5**	**HY1**	**HY2**	**HY3**	**HY4/5**
FA	0.98	0.9	0.96	0.99	0.94	0.90	0.96	0.96
MD	0.97	0.91	0.96	0.99	0.95	0.90	0.92	0.97
AD	0.99	0.90	0.95	0.99	0.97	0.88	0.95	0.97
RD	0.96	0.89	0.96	0.99	0.94	0.9	0.92	0.96

Supplementary Table 1: Correlation coefficients between original linear models, and validation analyses using ComBat harmonized data. Correlation coefficients for Validation Analysis #1 were generated when

comparing Cohen's *d* values from linear models run on ComBat harmonized data against Cohen's *d* values generated from linear mixed effects models comparing each HY stage to all control subjects. Correlation coefficients for Validation Analysis #2 were generated when comparing Cohen's *d* values from linear models run on ComBat harmonized data against Cohen's *d* values generated from linear mixed effects models comparing each HY stage to age- and sex-matched control subjects.

1.8 Between-group differences in DTI metrics: Total PD and Controls

1.8.1 Data: Differences in FA between the Total PD group and Controls

Total PD & Controls	*p*-value	Degrees of Freedom	Partial Cohen's *d*	Standard Error	Lower CI	Upper CI	p_{FDR}
Entire WM FA	0.65	2517	-0.019	0.04	-0.10	0.06	8.07×10^{-1}
ACR FA	0.04	2517	-0.086	0.04	-0.16	-0.01	2.96×10^{-1}
SCR FA	0.48	2517	0.029	0.04	-0.05	0.11	7.62×10^{-1}
PCR FA	0.14	2517	-0.061	0.04	-0.14	0.02	4.49×10^{-1}
ALIC FA	0.92	2517	-0.004	0.04	-0.08	0.07	9.60×10^{-1}
PLIC FA	0.10	2517	0.068	0.04	-0.01	0.15	4.49×10^{-1}
RLIC FA	0.63	2517	0.020	0.04	-0.06	0.10	8.07×10^{-1}
EC FA	0.09	2517	-0.070	0.04	-0.15	0.01	4.49×10^{-1}
FX FA	0.00	2517	-0.245	0.04	-0.32	-0.17	1.20×10^{-7}
FXST FA	0.21	2517	-0.053	0.04	-0.13	0.03	4.71×10^{-1}
PTR FA	0.03	2517	-0.092	0.04	-0.17	-0.01	2.96×10^{-1}
GCC FA	0.21	2517	-0.052	0.04	-0.13	0.03	4.71×10^{-1}
BCC FA	0.99	2517	0.001	0.04	-0.08	0.08	9.89×10^{-1}
SCC FA	0.77	2517	0.012	0.04	-0.07	0.09	8.72×10^{-1}
CGC FA	0.13	2517	-0.063	0.04	-0.14	0.02	4.49×10^{-1}
CGH FA	0.63	2517	0.020	0.04	-0.06	0.10	8.07×10^{-1}
CST FA	0.46	2517	0.031	0.04	-0.05	0.11	7.62×10^{-1}
SFO FA	0.66	2517	-0.018	0.04	-0.10	0.06	8.07×10^{-1}
SLF FA	0.17	2517	-0.058	0.04	-0.14	0.02	4.55×10^{-1}
SS FA	0.27	2517	-0.046	0.04	-0.12	0.03	5.42×10^{-1}
TAP FA	0.79	2517	-0.011	0.04	-0.09	0.07	8.72×10^{-1}
UNC FA	0.42	2517	-0.034	0.04	-0.11	0.04	7.62×10^{-1}

1.8.2 Data: Differences in MD between the Total PD group and Controls

Total PD & Controls	*p*-value	Degrees of Freedom	Partial Cohen's *d*	Standard Error	Lower CI	Upper CI	p_{FDR}
Entire WM MD	0.84	2517	0.008	0.04	-0.07	0.09	8.39×10^{-1}

ACR MD	0.14	2517	0.062	0.04	-0.02	0.14	3.50×10^{-1}
SCR MD	0.17	2517	0.057	0.04	-0.02	0.14	3.65×10^{-1}
PCR MD	0.18	2517	0.056	0.04	-0.02	0.13	3.65×10^{-1}
ALIC MD	0.14	2517	-0.061	0.04	-0.14	0.02	3.50×10^{-1}
PLIC MD	0.06	2517	-0.078	0.04	-0.16	0.00	2.70×10^{-1}
RLIC MD	0.01	2517	-0.107	0.04	-0.19	-0.03	7.54×10^{-2}
EC MD	0.64	2517	0.020	0.04	-0.06	0.10	7.42×10^{-1}
FX MD	0.00	2517	0.166	0.04	0.09	0.24	1.27×10^{-3}
FXST MD	0.03	2517	-0.090	0.04	-0.17	-0.01	1.77×10^{-1}
PTR MD	0.67	2517	-0.018	0.04	-0.10	0.06	7.42×10^{-1}
GCC MD	0.60	2517	0.022	0.04	-0.06	0.10	7.42×10^{-1}
BCC MD	0.30	2517	0.043	0.04	-0.03	0.12	5.16×10^{-1}
SCC MD	0.64	2517	0.019	0.04	-0.06	0.10	7.42×10^{-1}
CGC MD	0.34	2517	-0.040	0.04	-0.12	0.04	5.40×10^{-1}
CGH MD	0.00	2517	-0.162	0.04	-0.24	-0.08	1.27×10^{-3}
CST MD	0.27	2517	-0.047	0.04	-0.12	0.03	4.87×10^{-1}
SFO MD	0.49	2517	0.029	0.04	-0.05	0.11	6.80×10^{-1}
SLF MD	0.43	2517	0.033	0.04	-0.04	0.11	6.27×10^{-1}
SS MD	0.14	2517	-0.062	0.04	-0.14	0.02	3.50×10^{-1}
TAP MD	0.11	2517	0.067	0.04	-0.01	0.14	3.50×10^{-1}
UNC MD	0.81	2517	0.010	0.04	-0.07	0.09	8.39×10^{-1}

1.8.3 Data: Differences in AD between the Total PD group and Controls

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM AD	0.29	2517	-0.044	0.040	-0.12	0.03	4.96×10^{-1}
ACR AD	0.79	2517	0.011	0.040	-0.07	0.09	8.24×10^{-1}
SCR AD	0.09	2517	0.070	0.040	-0.01	0.15	2.03×10^{-1}
PCR AD	0.63	2517	0.020	0.040	-0.06	0.10	7.90×10^{-1}
ALIC AD	0.01	2517	-0.107	0.040	-0.19	-0.03	4.55×10^{-2}
PLIC AD	0.19	2517	-0.055	0.040	-0.13	0.02	3.72×10^{-1}
RLIC AD	0.00	2517	-0.133	0.040	-0.21	-0.06	1.08×10^{-2}
EC AD	0.65	2517	-0.019	0.040	-0.10	0.06	7.90×10^{-1}
FX AD	0.02	2517	0.102	0.040	0.02	0.18	5.59×10^{-2}
FXST AD	0.00	2517	-0.163	0.040	-0.24	-0.08	1.15×10^{-3}
PTR AD	0.02	2517	-0.098	0.040	-0.18	-0.02	6.03×10^{-2}

GCC AD	0.76	2517	-0.013	0.040	-0.09	0.07	8.24×10^{-1}
BCC AD	0.22	2517	0.052	0.040	-0.03	0.13	3.98×10^{-1}
SCC AD	0.34	2517	0.040	0.040	-0.04	0.12	5.10×10^{-1}
CGC AD	0.03	2517	-0.092	0.040	-0.17	-0.01	7.68×10^{-2}
CGH AD	0.00	2517	-0.214	0.040	-0.29	-0.14	7.05×10^{-6}
CST AD	0.55	2517	-0.025	0.040	-0.10	0.05	7.59×10^{-1}
SFO AD	0.88	2517	0.006	0.040	-0.07	0.08	8.84×10^{-1}
SLF AD	0.70	2517	-0.016	0.040	-0.09	0.06	8.10×10^{-1}
SS AD	0.00	2517	-0.125	0.040	-0.20	-0.05	1.55×10^{-2}
TAP AD	0.09	2517	0.072	0.040	-0.01	0.15	2.03×10^{-1}
UNC AD	0.35	2517	-0.039	0.040	-0.12	0.04	5.10×10^{-1}

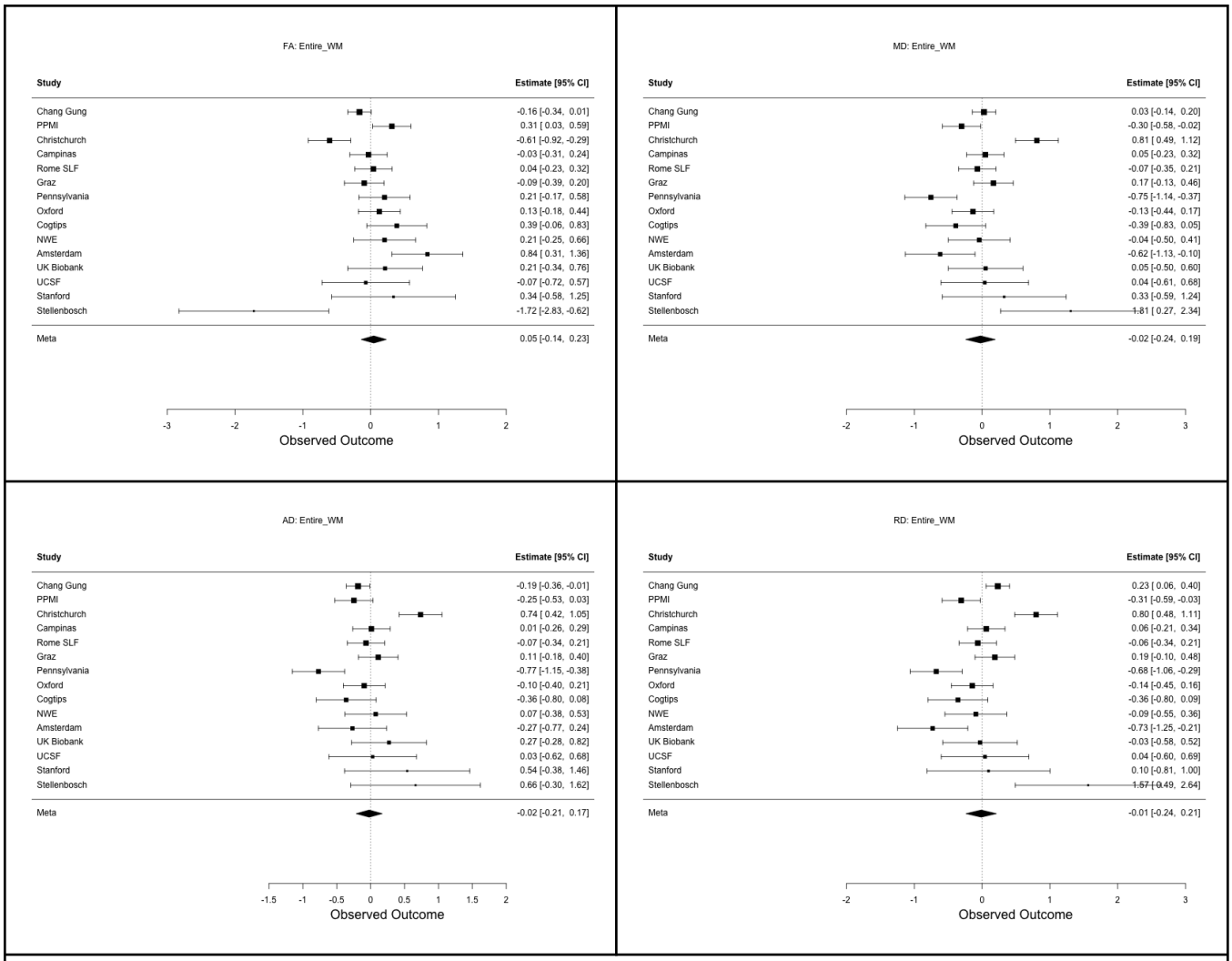
1.8.4 Data: Differences in RD between the Total PD group and Controls

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Partial Cohen's *d***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM RD	0.28	2517	0.045	0.04	-0.03	0.12	4.84×10^{-1}
ACR RD	0.04	2517	0.085	0.04	0.01	0.16	4.05×10^{-1}
SCR RD	0.42	2517	0.034	0.04	-0.04	0.11	5.71×10^{-1}
PCR RD	0.09	2517	0.071	0.04	-0.01	0.15	4.05×10^{-1}
ALIC RD	0.89	2517	-0.006	0.04	-0.08	0.07	9.37×10^{-1}
PLIC RD	0.09	2517	-0.071	0.04	-0.15	0.01	4.05×10^{-1}
RLIC RD	0.20	2517	-0.054	0.04	-0.13	0.02	4.84×10^{-1}
EC RD	0.28	2517	0.045	0.04	-0.03	0.12	4.84×10^{-1}
FX RD	0.00	2517	0.193	0.04	0.12	0.27	8.98×10^{-5}
FXST RD	0.94	2517	0.003	0.04	-0.07	0.08	9.37×10^{-1}
PTR RD	0.32	2517	0.042	0.04	-0.04	0.12	4.84×10^{-1}
GCC RD	0.24	2517	0.049	0.04	-0.03	0.13	4.84×10^{-1}
BCC RD	0.48	2517	0.030	0.04	-0.05	0.11	6.15×10^{-1}
SCC RD	0.60	2517	0.022	0.04	-0.06	0.10	6.94×10^{-1}
CGC RD	0.55	2517	0.025	0.04	-0.05	0.10	6.78×10^{-1}
CGH RD	0.09	2517	-0.071	0.04	-0.15	0.01	4.05×10^{-1}
CST RD	0.30	2517	-0.043	0.04	-0.12	0.03	4.84×10^{-1}
SFO RD	0.33	2517	0.041	0.04	-0.04	0.12	4.84×10^{-1}
SLF RD	0.16	2517	0.059	0.04	-0.02	0.14	4.84×10^{-1}
SS RD	0.92	2517	-0.004	0.04	-0.08	0.07	9.37×10^{-1}
TAP RD	0.20	2517	0.053	0.04	-0.02	0.13	4.84×10^{-1}

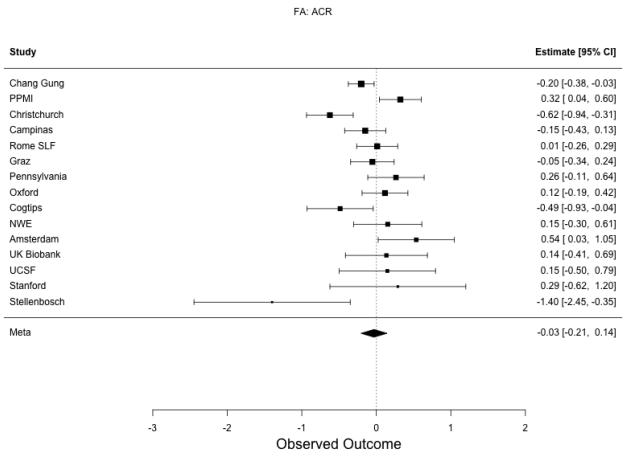
UNC RD	0.23	2517	0.051	0.04	-0.03	0.13	4.84×10^{-1}

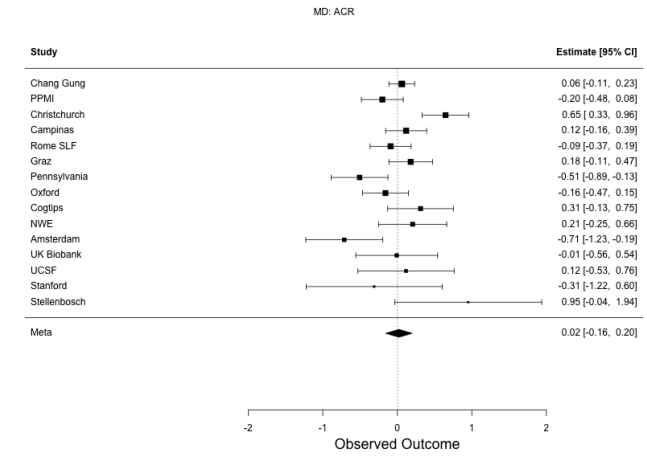
1.9 RE-Meta Analysis: Between-Group Differences in FA and MD

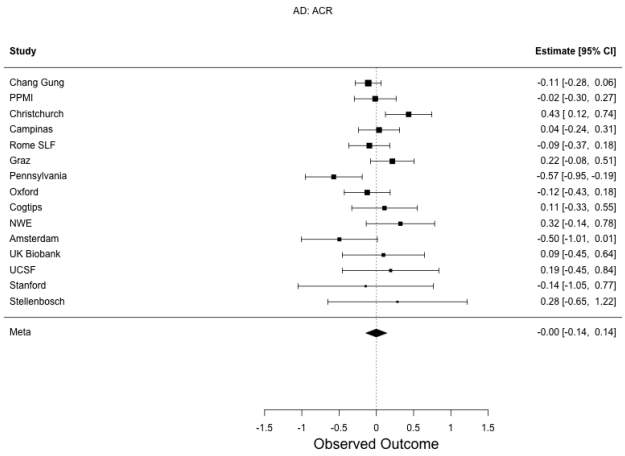
Random-effects meta analysis revealed no significant differences in FA, MD, AD or RD for any region-of-interest.

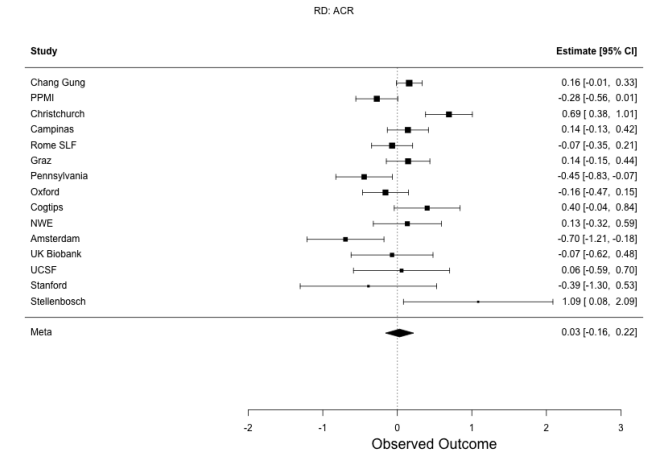


Supplementary Figure 13: Mixed effects meta analysis forest plots for the Entire WM ROI. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

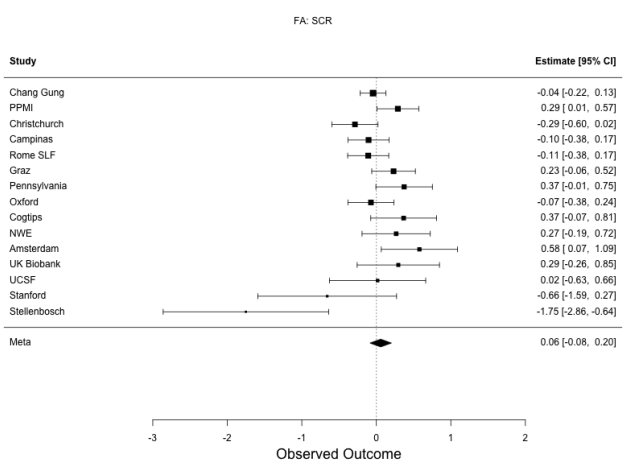


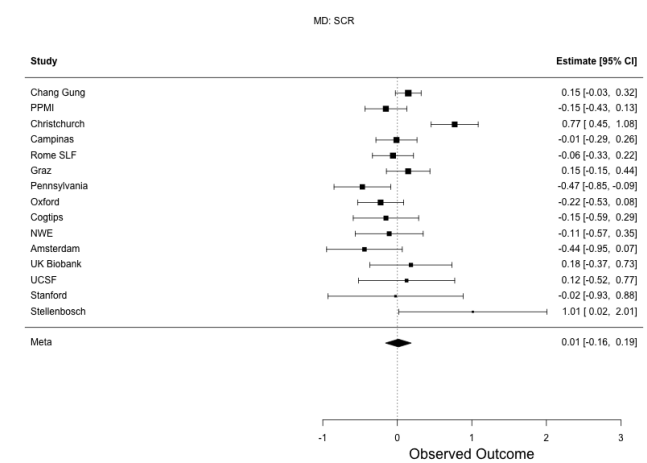


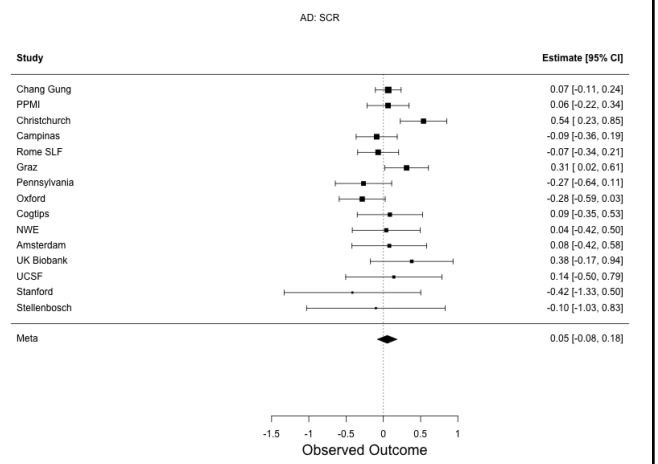


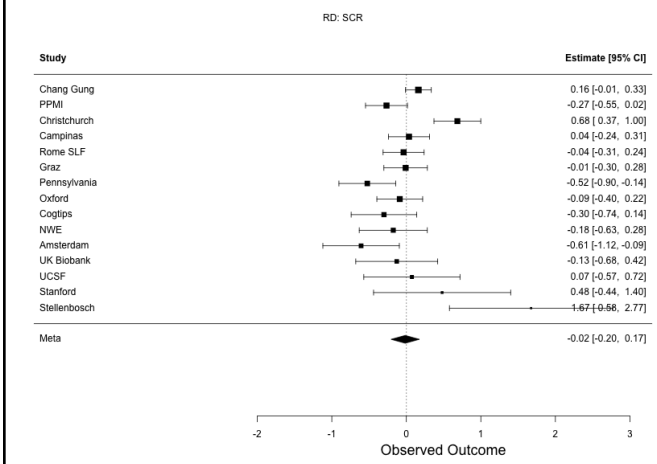


Supplementary Figure 14: Mixed effects meta analysis forest plots for the ACR. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

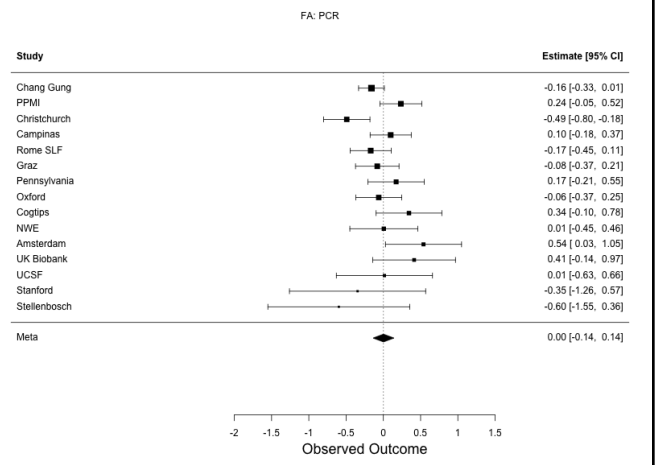


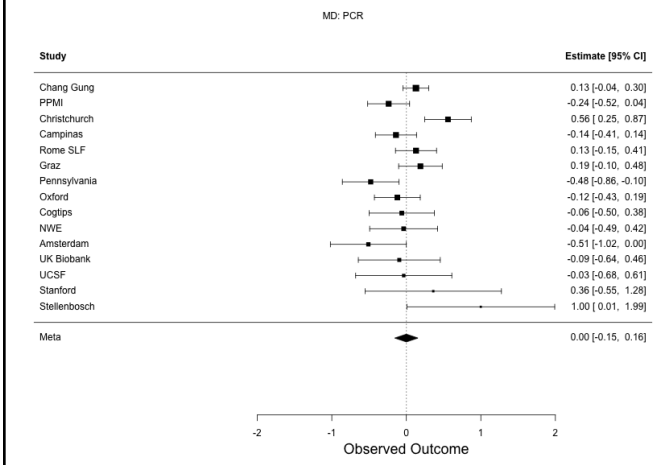


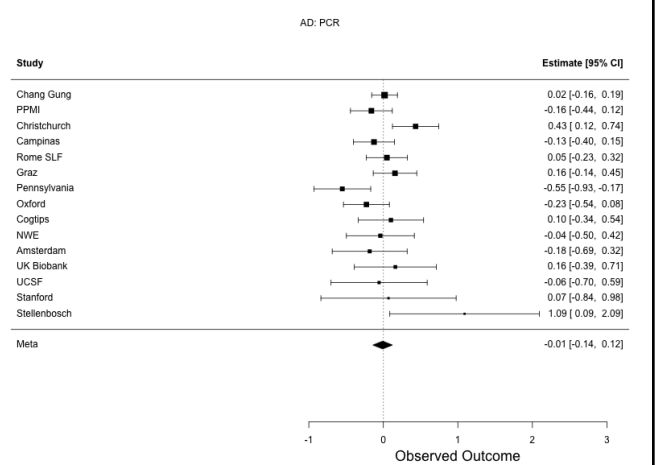


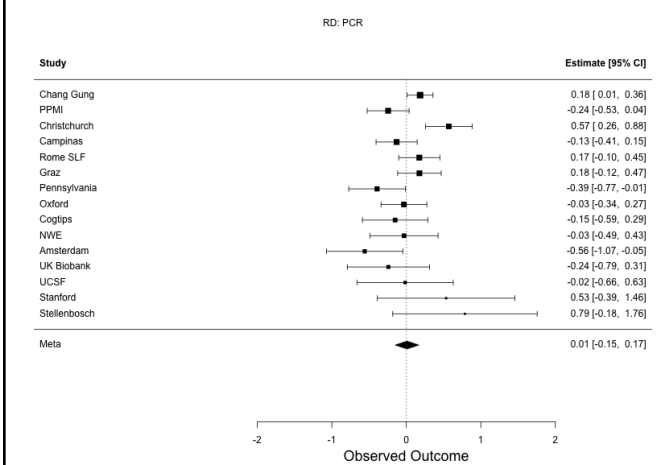


Supplementary Figure 15: Mixed effects meta analysis forest plots for the SCR. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.



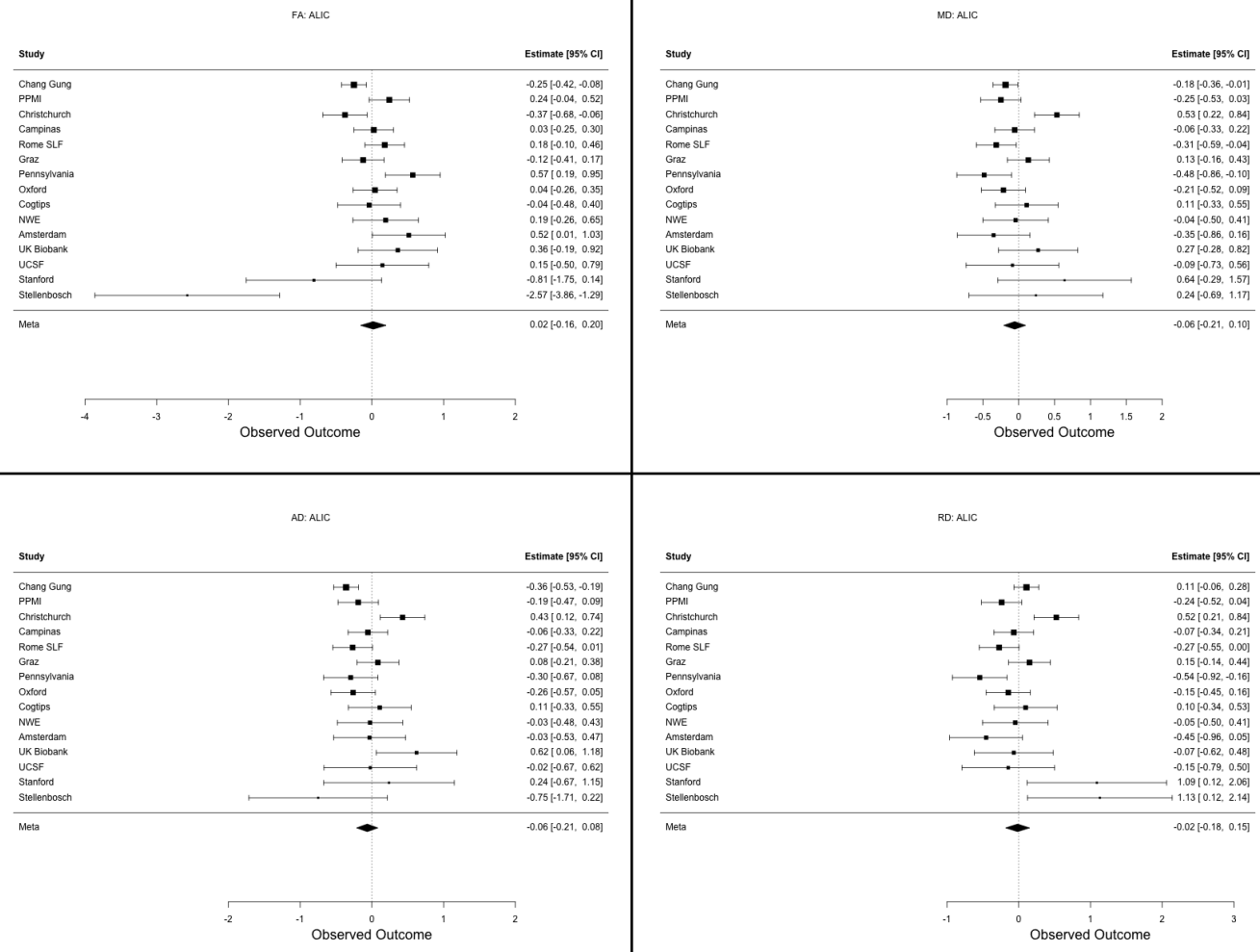




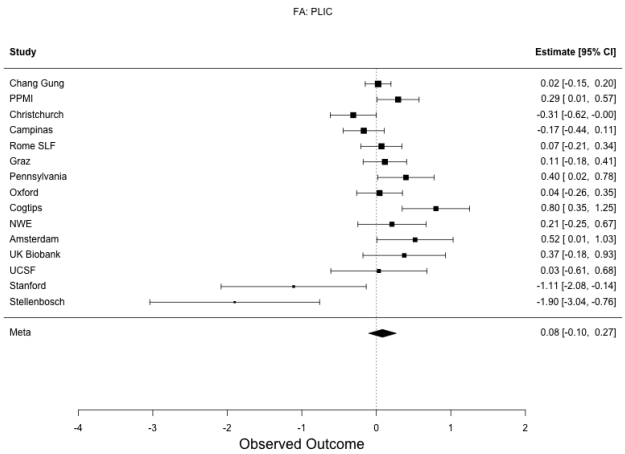


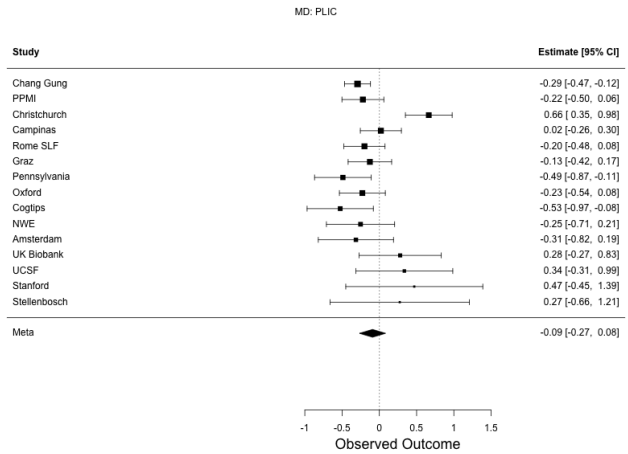
Supplementary Figure 16: Mixed effects meta analysis forest plots for the PCR. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in

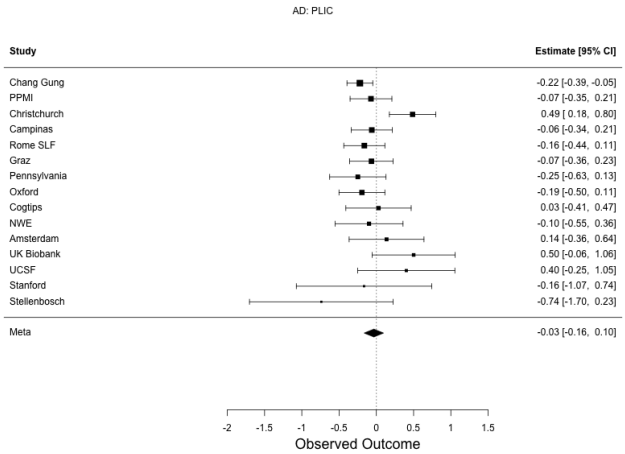
descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

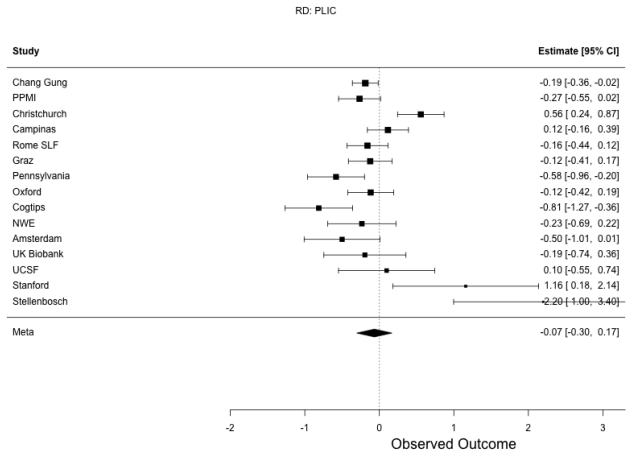


Supplementary Figure 17: Mixed effects meta analysis forest plots for the ALIC. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

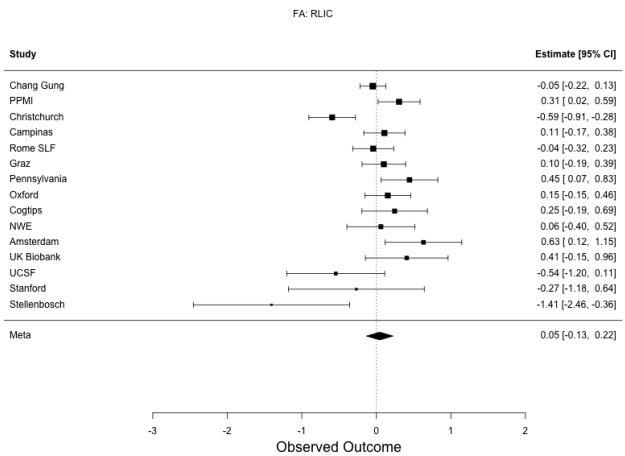


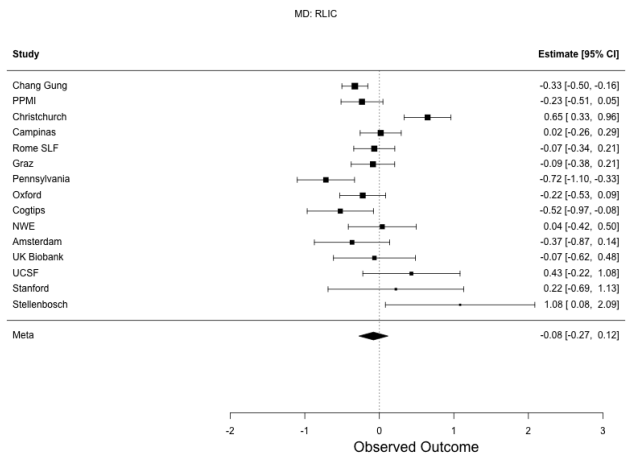


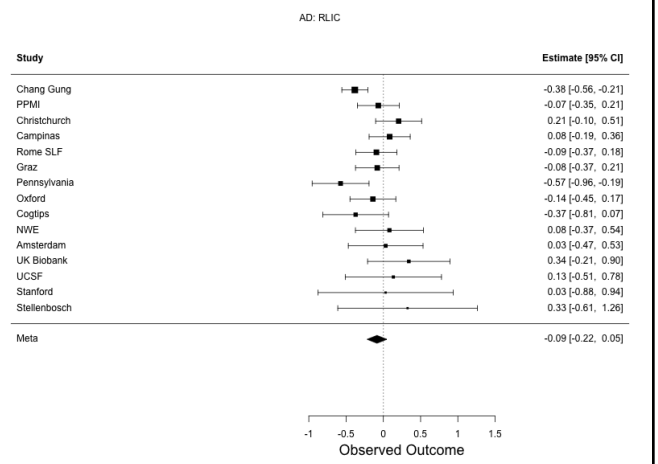


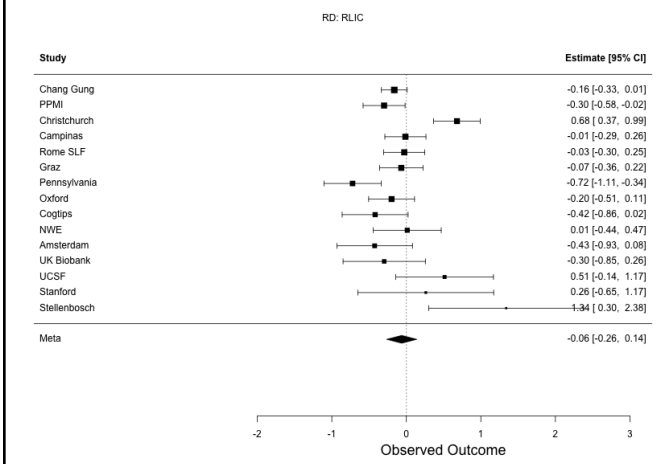


Supplementary Figure 18: Mixed effects meta analysis forest plots for the PLIC. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

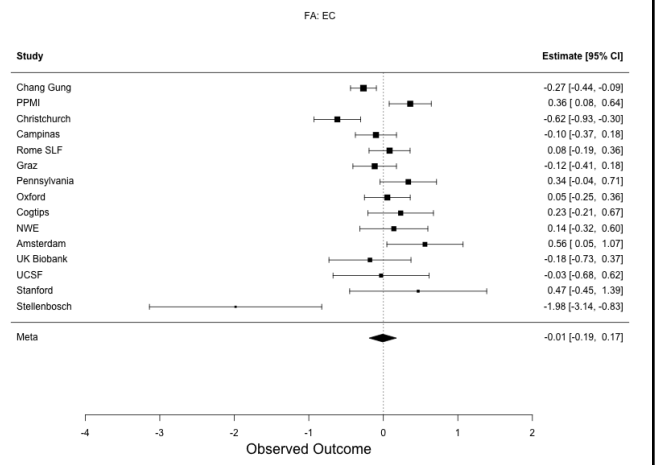


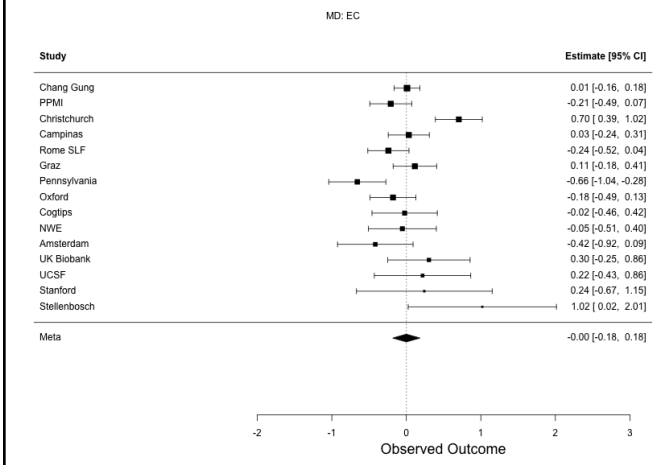


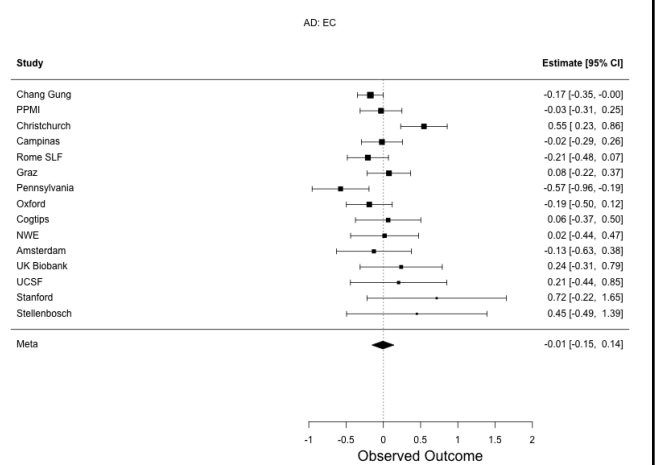


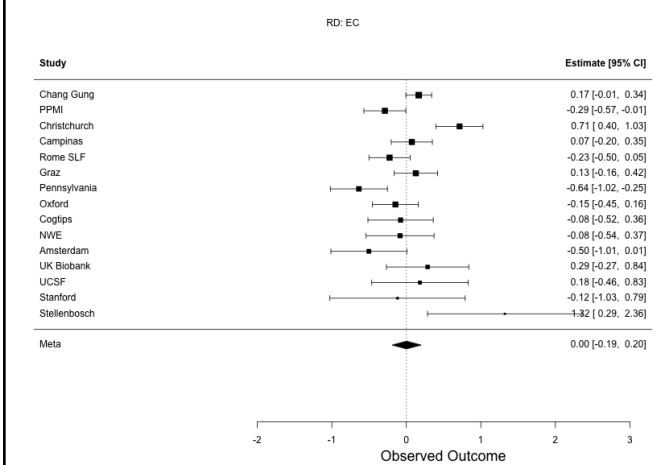


Supplementary Figure 19: Mixed effects meta analysis forest plots for the RLIC. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.



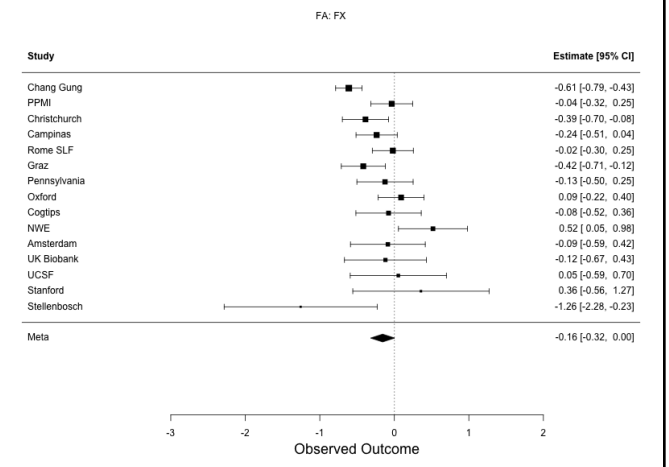


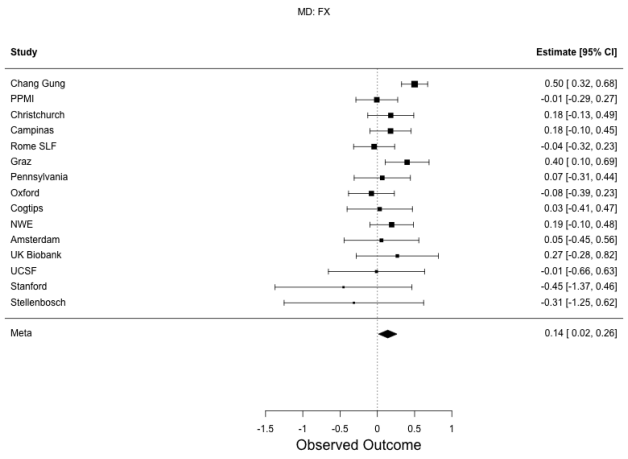


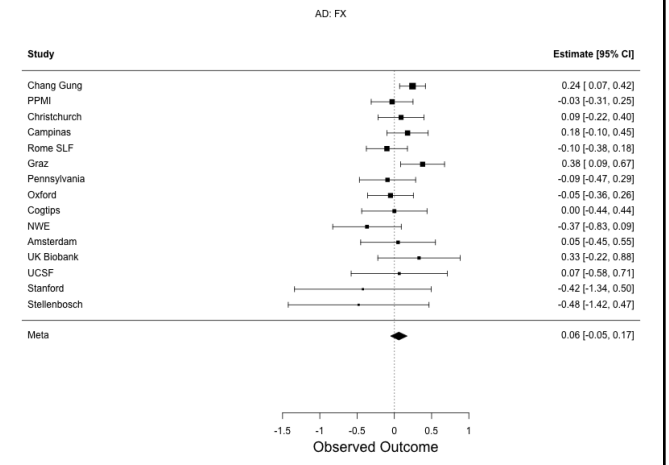


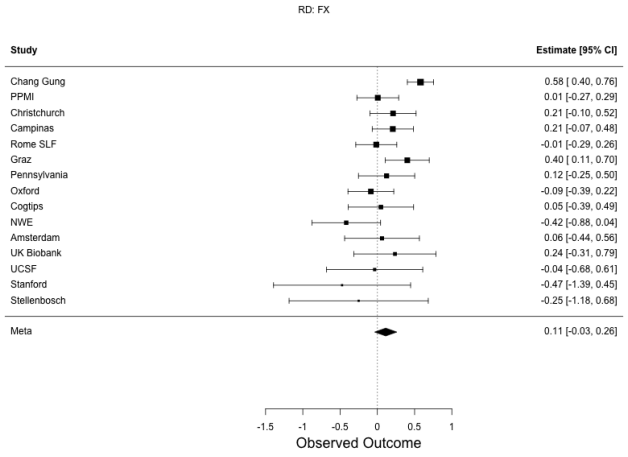
Supplementary Figure 20: Mixed effects meta analysis forest plots for the EC. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in

descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

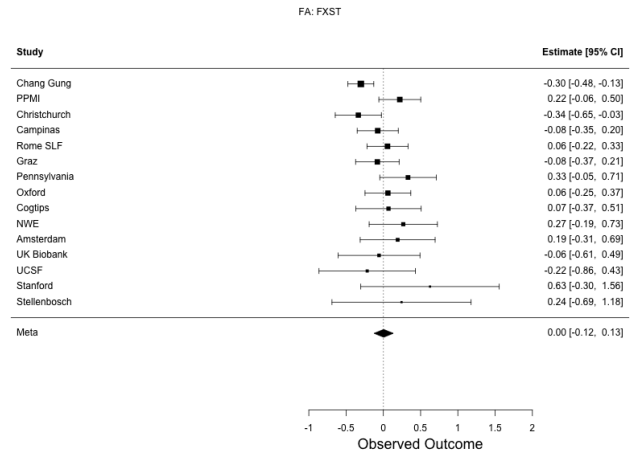


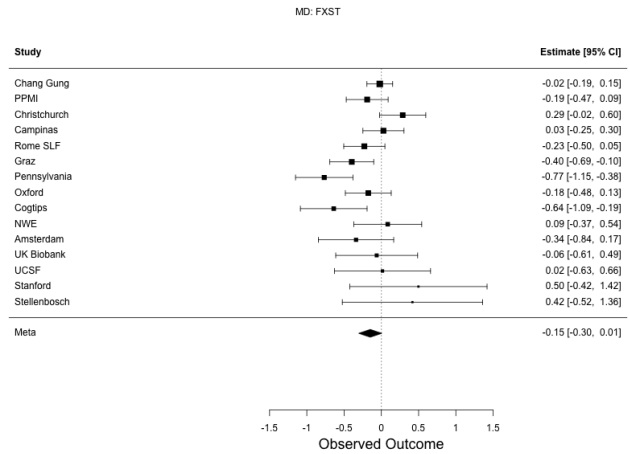


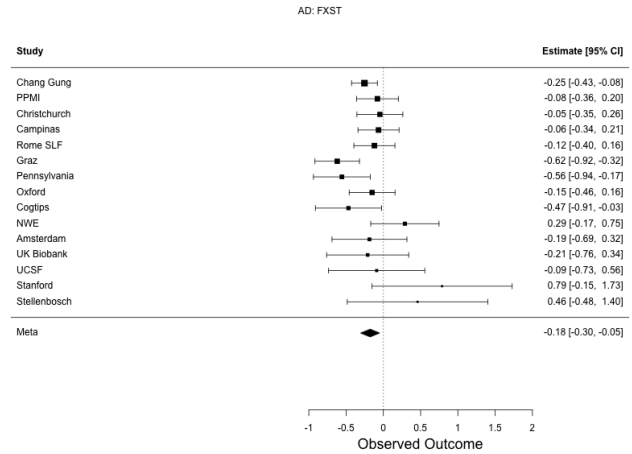


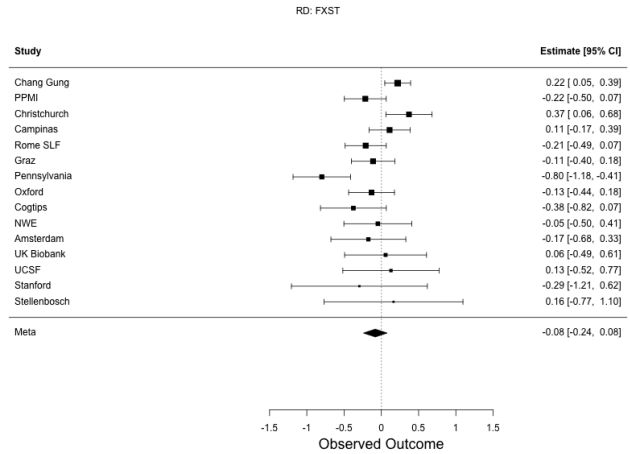


Supplementary Figure 21: Mixed effects meta analysis forest plots for the FX. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

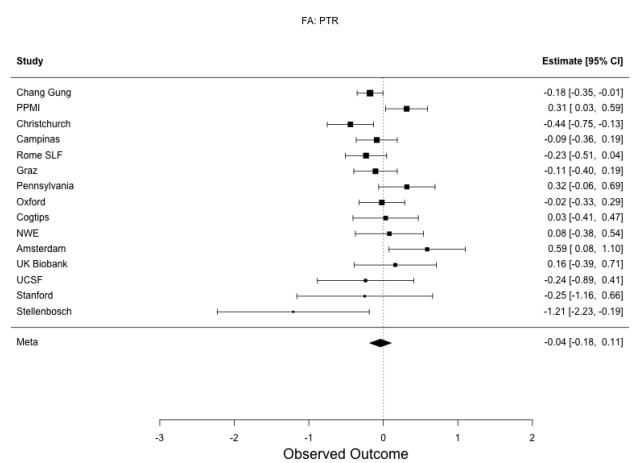


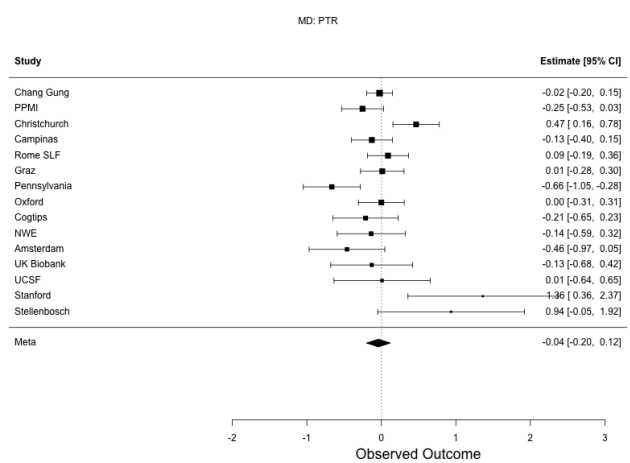


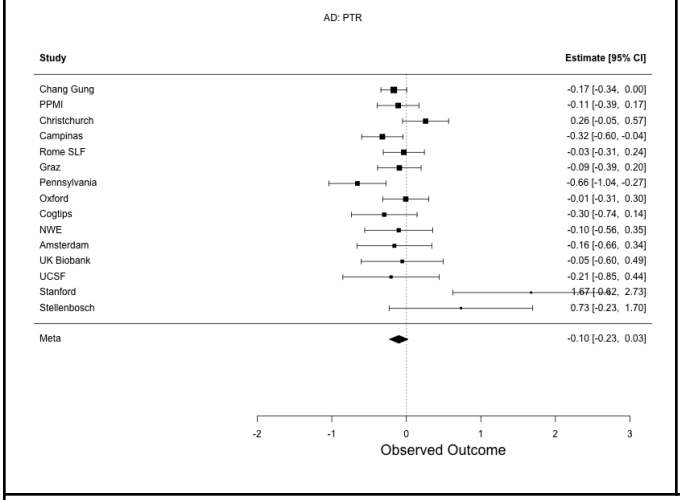


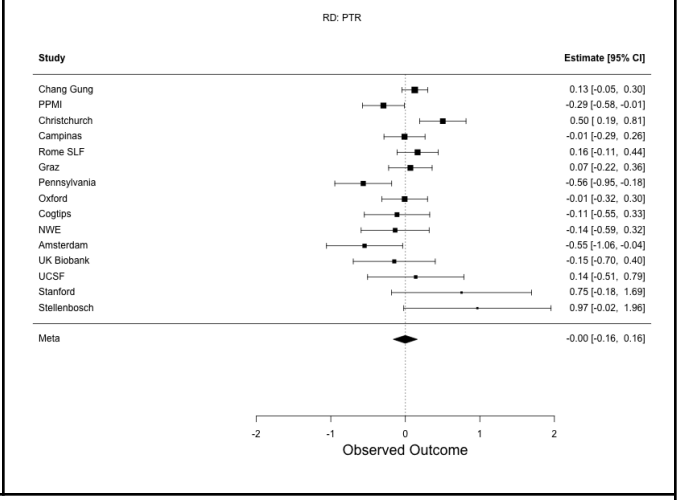


Supplementary Figure 22: Mixed effects meta analysis forest plots for the FXST. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

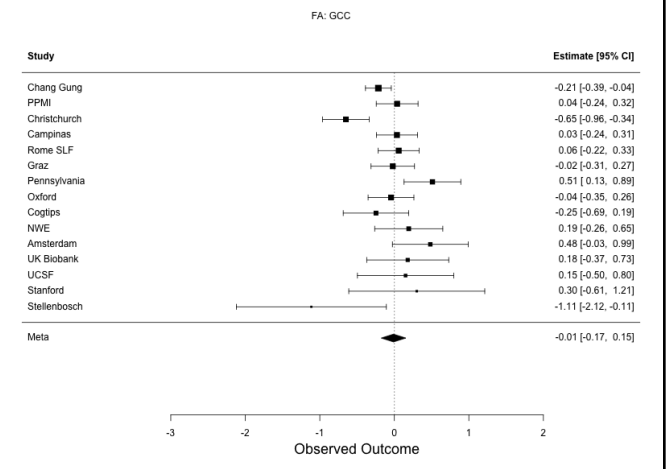


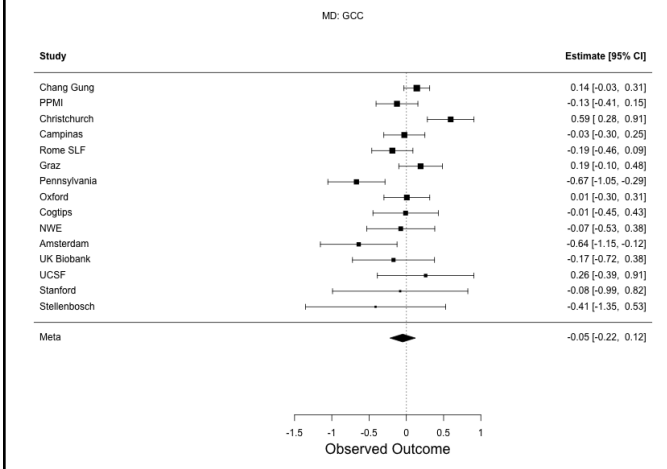


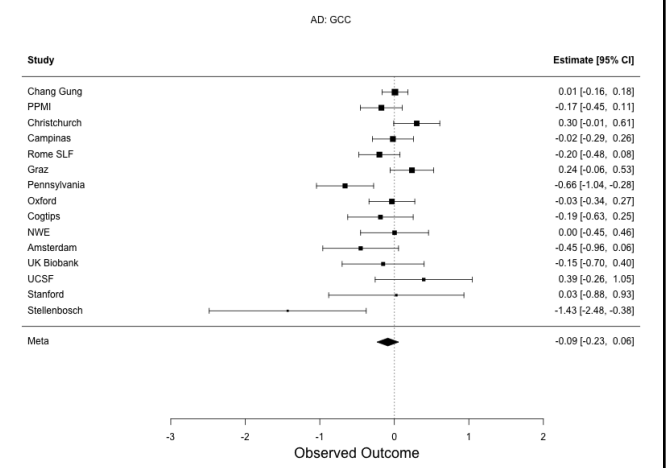


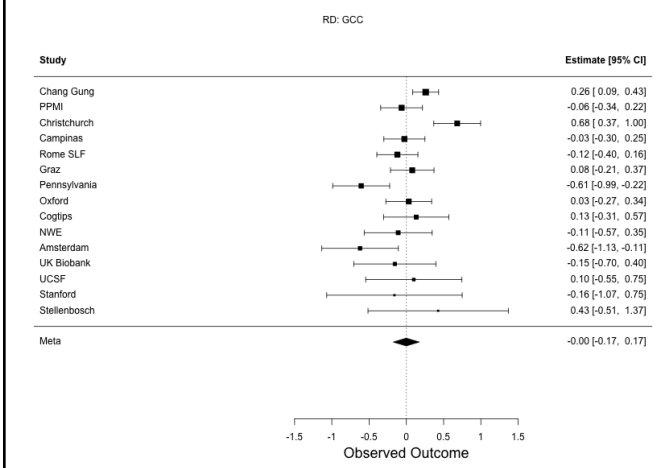


Supplementary Figure 23: Mixed effects meta analysis forest plots for the PTR. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.



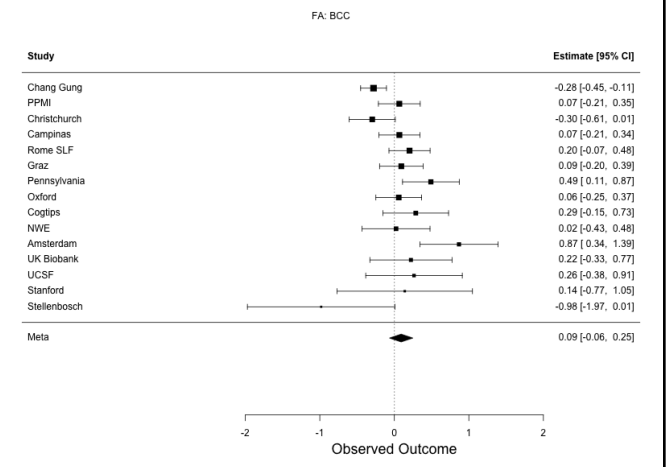


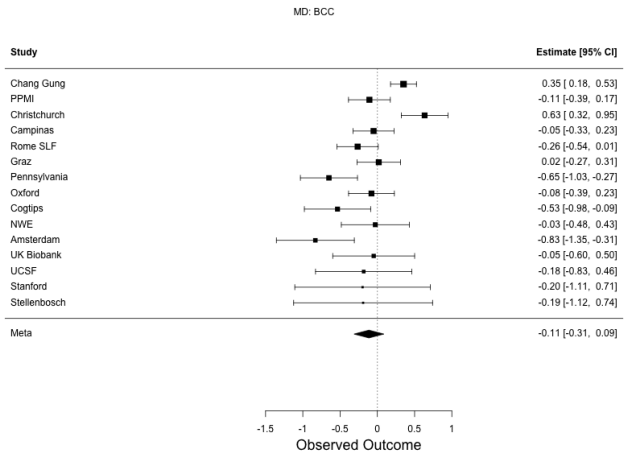


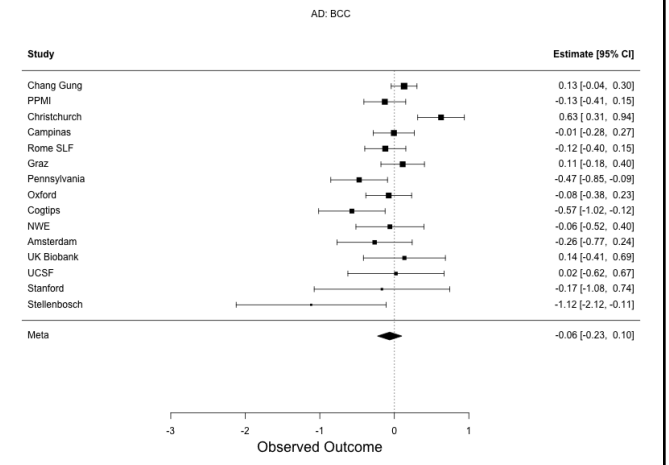


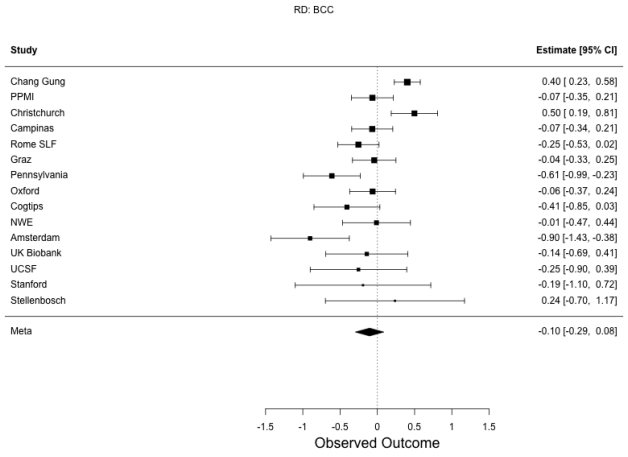
Supplementary Figure 24: Mixed effects meta analysis forest plots for the GCC. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in

descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

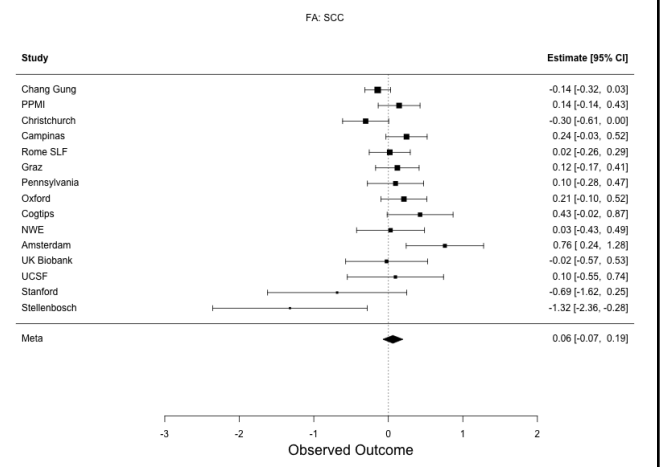


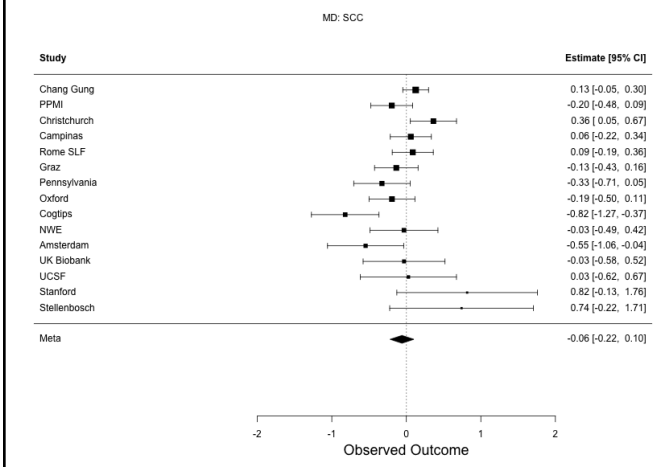


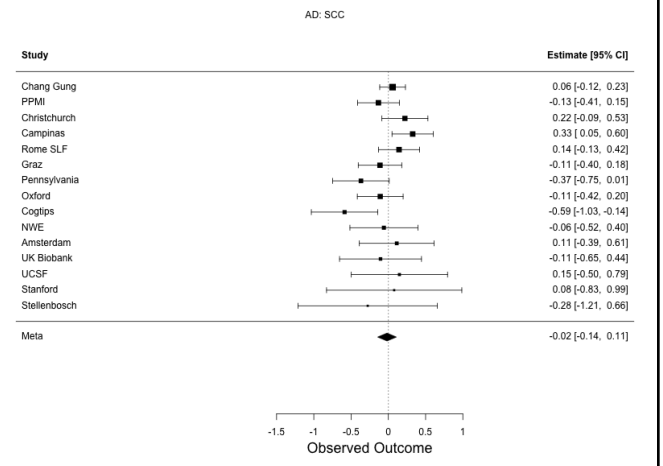


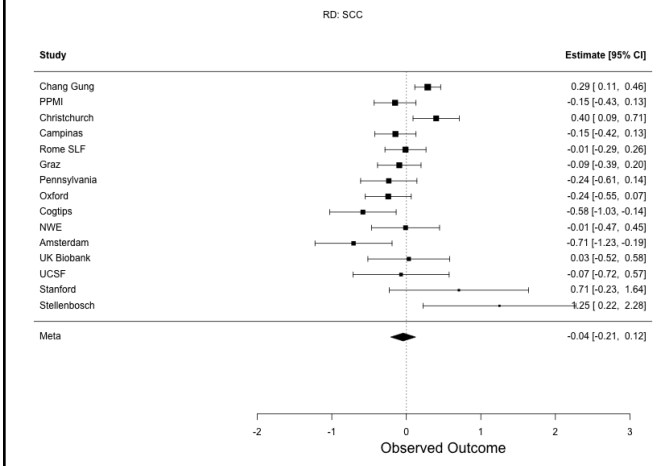


Supplementary Figure 25: Mixed effects meta analysis forest plots for the BCC. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

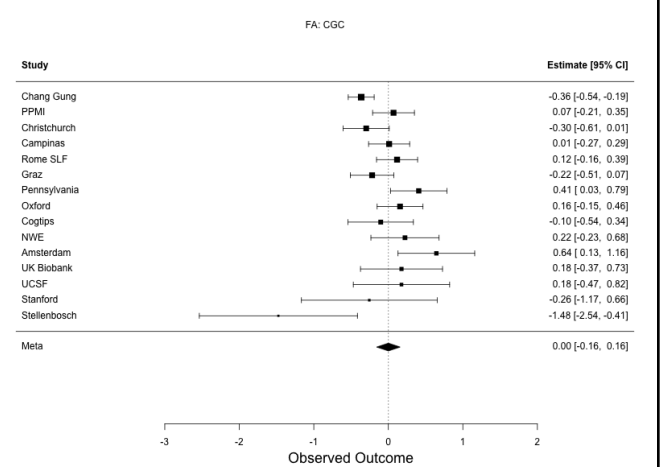


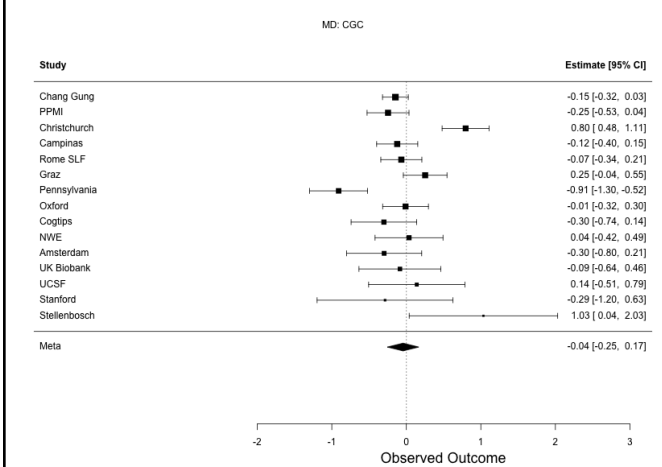


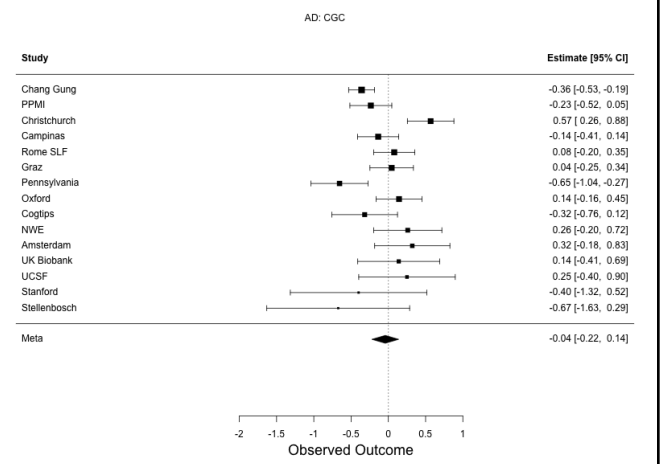


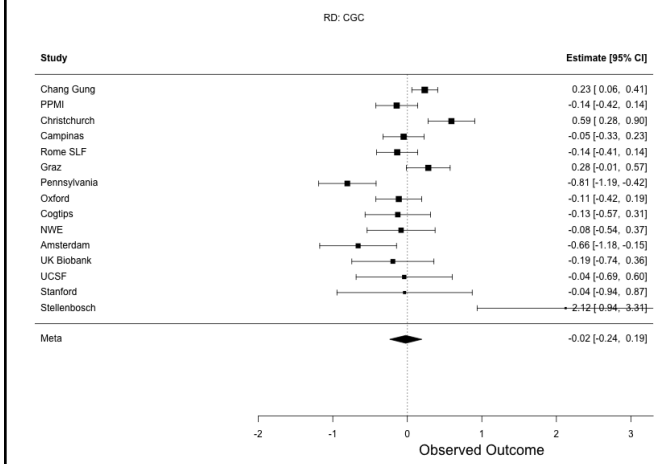


Supplementary Figure 26: Mixed effects meta analysis forest plots for the SCC. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

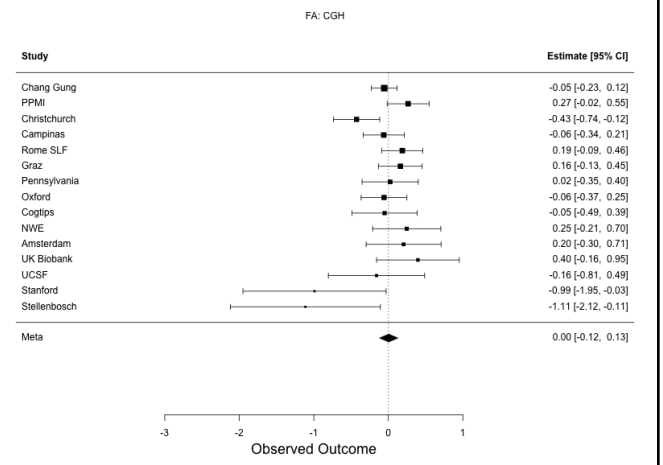


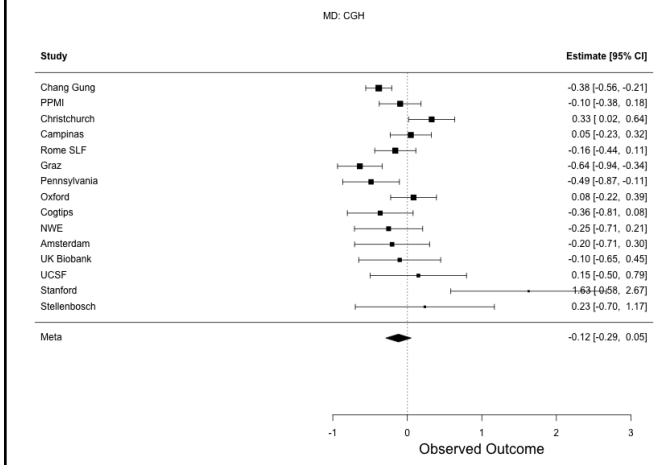


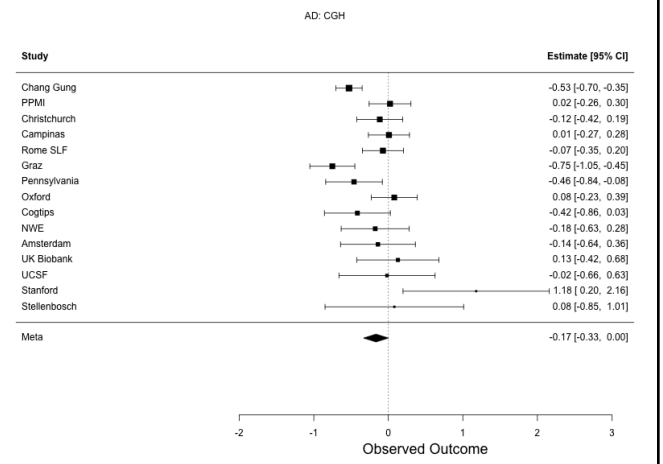


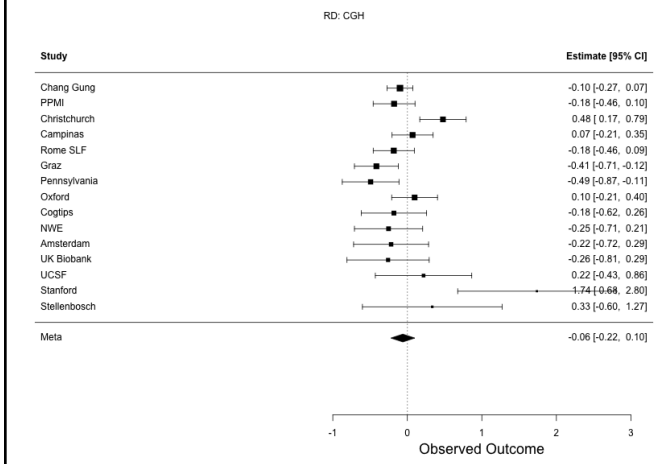


Supplementary Figure 27: Mixed effects meta analysis forest plots for the CGC. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.



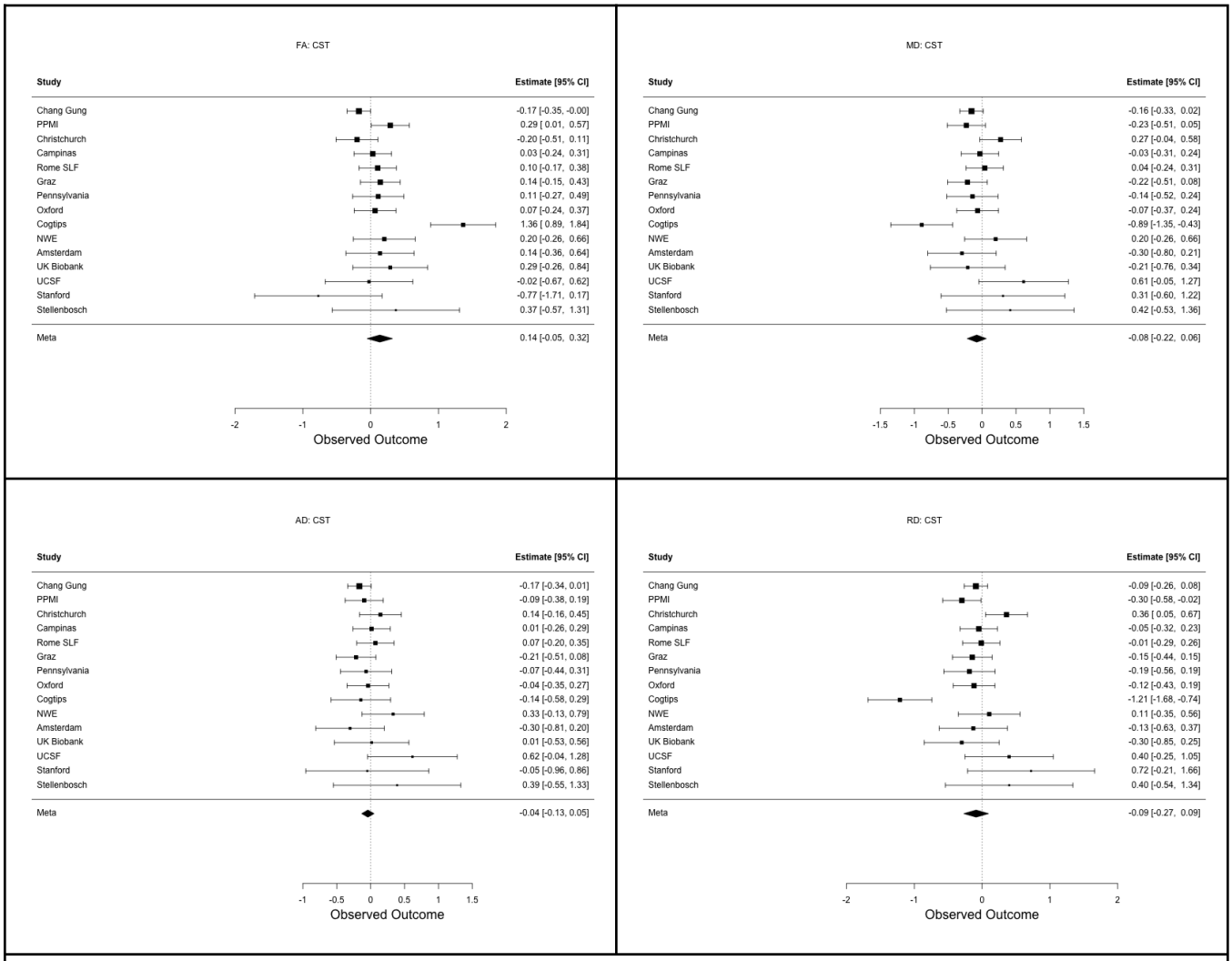




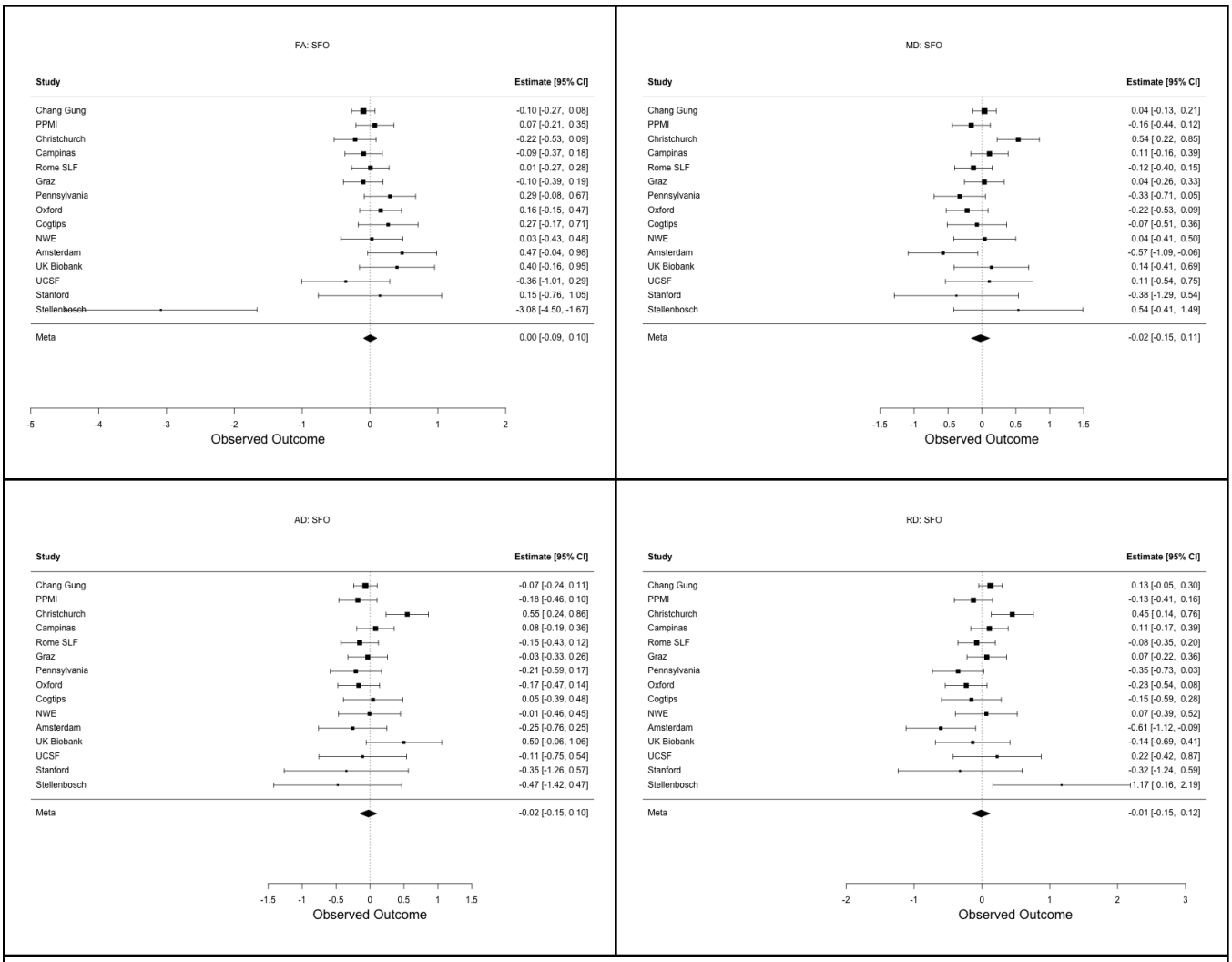


Supplementary Figure 28: Mixed effects meta analysis forest plots for the CGH. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in

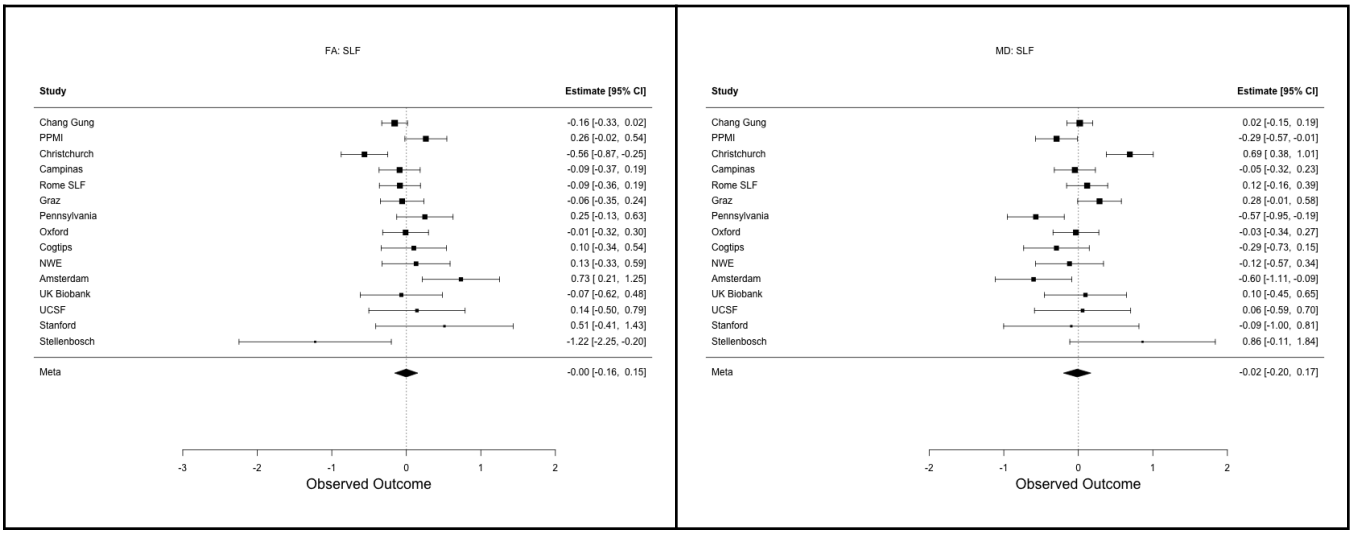
descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

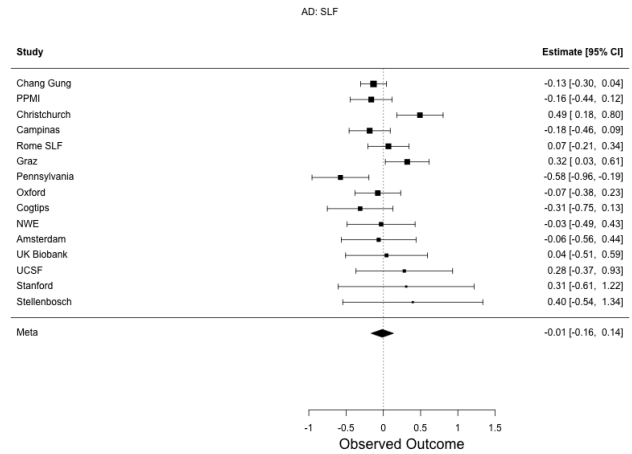


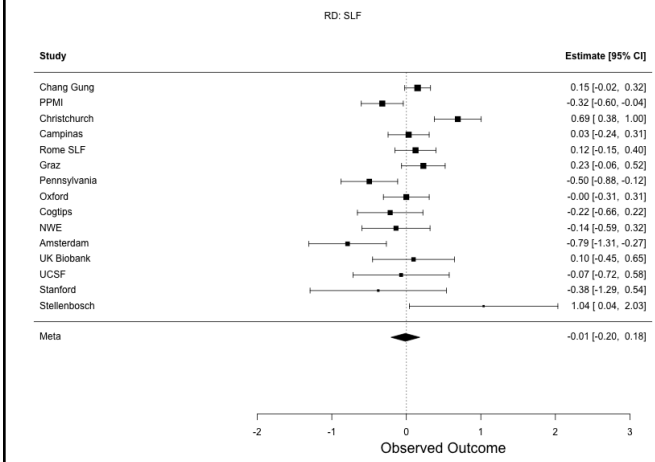
Supplementary Figure 29: Mixed effects meta analysis forest plots for the CST. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.



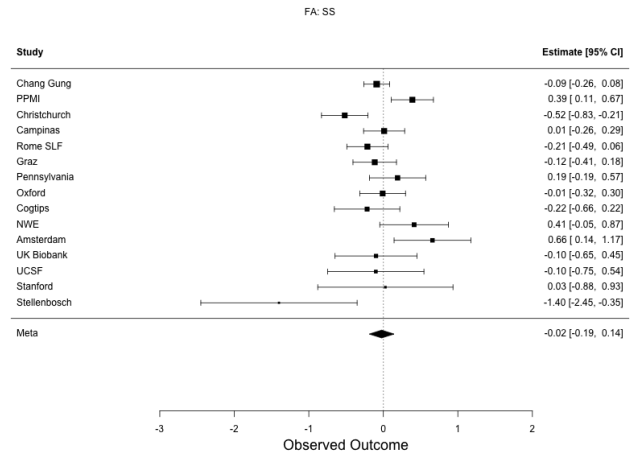
Supplementary Figure 30: Mixed effects meta analysis forest plots for the SFO. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

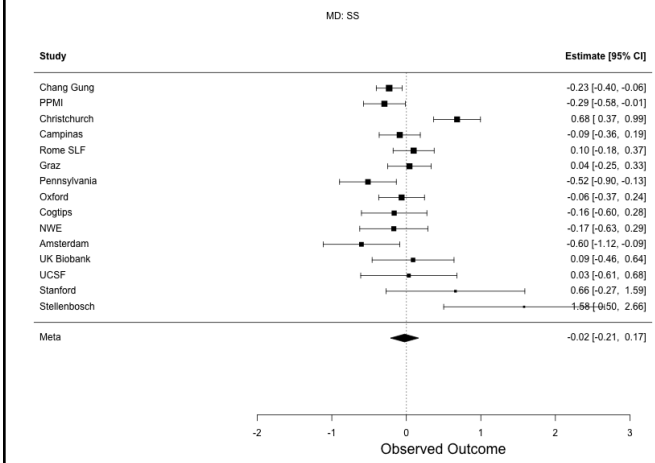


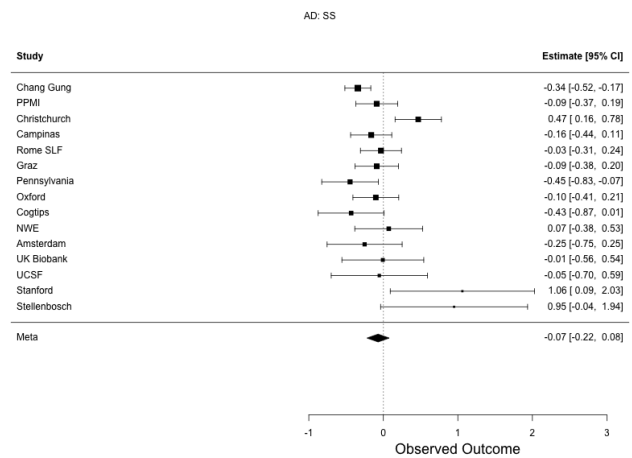


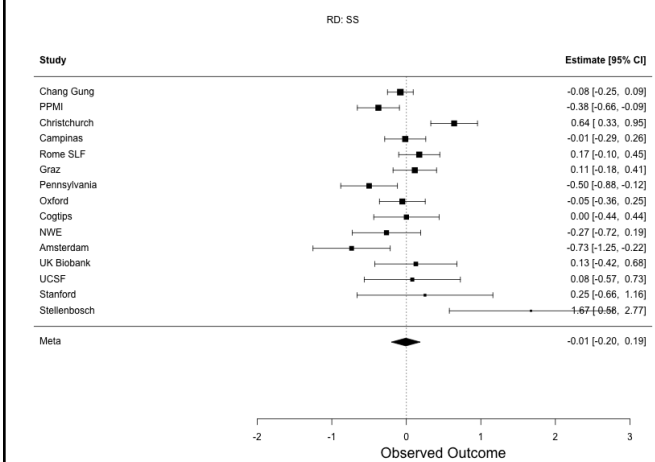


Supplementary Figure 31: Mixed effects meta analysis forest plots for the SLF. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.



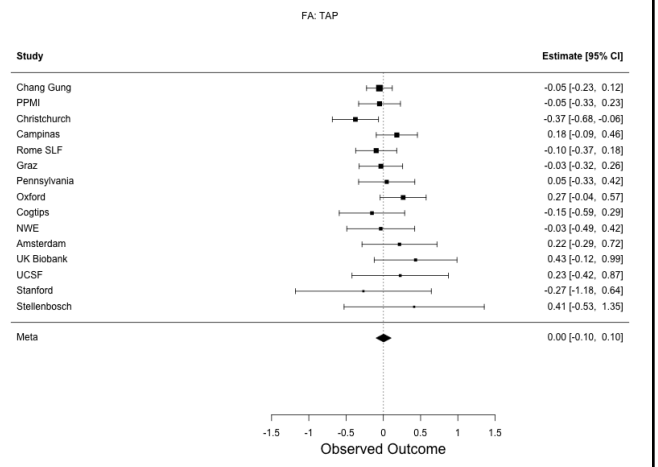


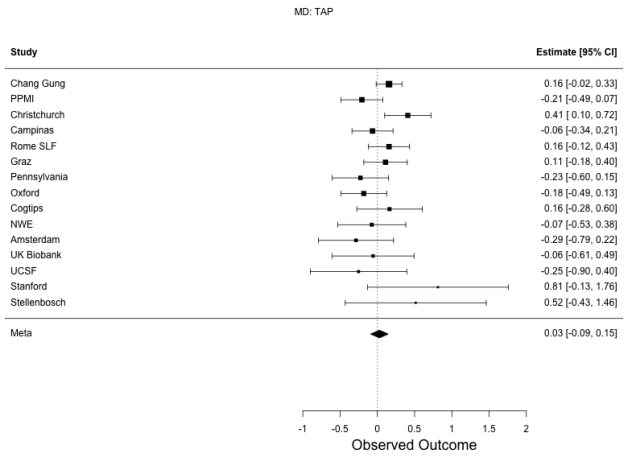


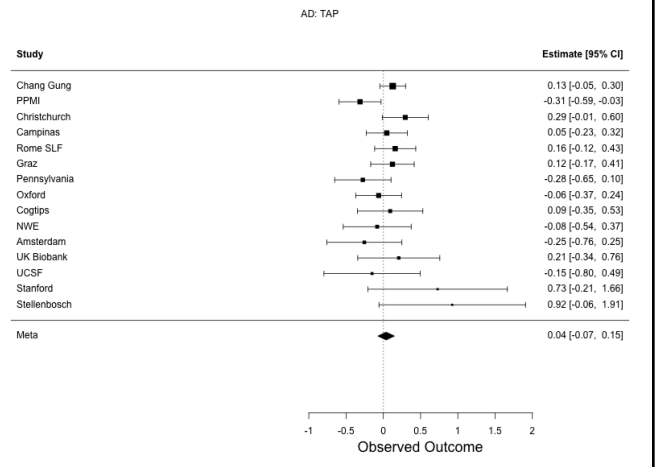


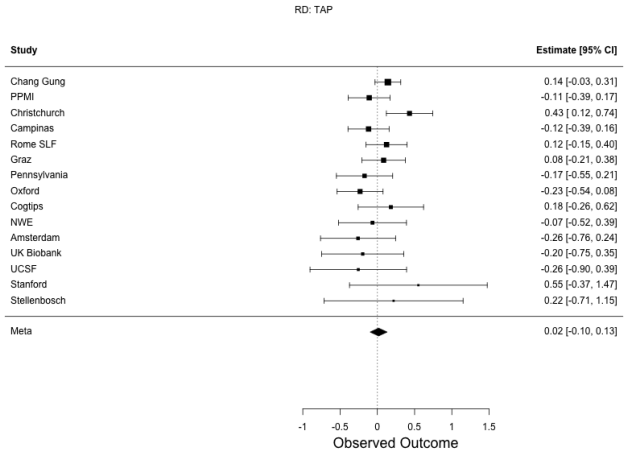
Supplementary Figure 32: Mixed effects meta analysis forest plots for the SS. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in

descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

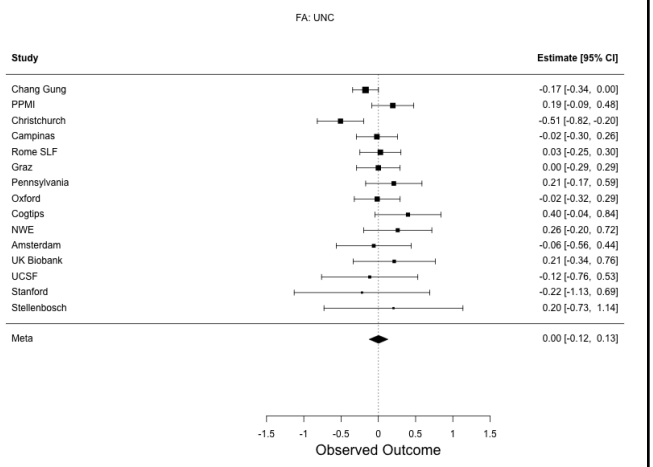


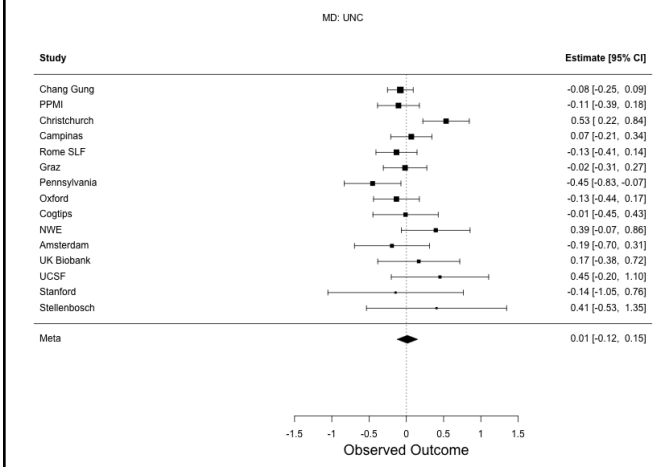


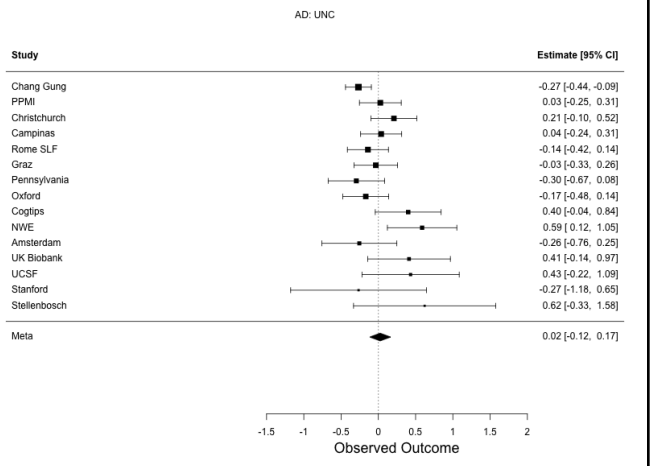


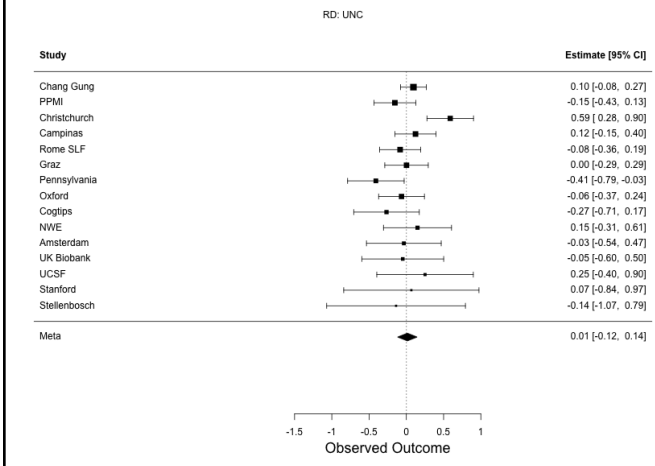


Supplementary Figure 33: Mixed effects meta analysis forest plots for the TAP. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.









Supplementary Figure 34: Mixed effects meta analysis forest plots for the UNC. Differences in DTI measures between PD participants and controls, assessed using random-effects meta-analysis. Sites listed in descending order based on sample size. FA, top left; MD, top right; AD, bottom left; RD, bottom right.

1.10 Partial Correlations: Within-group investigations between DTI metrics and clinical variables

1.10.1 PD participants: Partial correlation between DTI metrics and Montreal Cognitive Assessment scores

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Pearson's Correlation Coefficient *r***	**Standard Error**	**Lower CI**	**Upper CI**	**p_{FDR}**
Entire WM FA	0.00	890	0.11	0.03	0.042	0.171	1.57×10^{2}
ACR FA	0.04	890	0.07	0.03	0.003	0.133	8.21×10^{2}
SCR FA	0.90	890	0.00	0.03	-0.061	0.069	9.47×10^{1}
PCR FA	0.63	890	0.02	0.03	-0.049	0.081	7.31×10^{1}

ALIC FA	0.01	890	0.09	0.03	0.028	0.158	2.49×10^{2}
PLIC FA	0.52	890	0.02	0.03	-0.044	0.087	6.40×10^{1}
RLIC FA	0.36	890	0.03	0.03	-0.034	0.096	4.60×10^{1}
EC FA	0.00	890	0.10	0.03	0.038	0.167	1.58×10^{2}
FX FA	0.00	890	0.13	0.03	0.062	0.192	3.13×10^{3}
FXST FA	0.07	890	0.06	0.03	-0.004	0.126	1.08×10^{1}
PTR FA	0.01	890	0.09	0.03	0.028	0.157	2.49×10^{2}
GCC FA	0.02	890	0.08	0.03	0.015	0.145	5.34×10^{2}
BCC FA	0.09	890	0.06	0.03	-0.008	0.122	1.26×10^{1}
SCC FA	0.73	890	0.01	0.03	-0.054	0.077	8.06×10^{1}
CGC FA	0.09	890	0.06	0.03	-0.009	0.122	1.26×10^{1}
CGH FA	0.04	890	0.07	0.03	0.002	0.132	8.21×10^{2}
CST FA	0.04	890	0.07	0.03	0.003	0.133	8.21×10^{2}
SFO FA	0.07	890	0.06	0.03	-0.004	0.126	1.08×10^{1}
SLF FA	0.03	890	0.07	0.03	0.009	0.138	7.74×10^{2}
SS FA	0.01	890	0.09	0.03	0.026	0.155	2.49×10^{2}
TAP FA	1.00	890	0.00	0.03	-0.065	0.065	9.96×10^{1}
UNC FA	0.04	890	0.07	0.03	0.004	0.134	8.21×10^{2}

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Pearson's Correlation Coefficient *r***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM MD	0.00	890	-0.13	0.03	-0.19	-0.06	5.29×10^{4}
ACR MD	0.00	890	-0.15	0.03	-0.21	-0.09	4.02×10^{5}
SCR MD	0.00	890	-0.16	0.03	-0.22	-0.09	2.90×10^{5}
PCR MD	0.05	890	-0.07	0.03	-0.13	0.00	7.36×10^{2}
ALIC MD	0.00	890	-0.13	0.03	-0.19	-0.06	5.13×10^{4}
PLIC MD	0.03	890	-0.07	0.03	-0.14	-0.01	5.37×10^{2}
RLIC MD	0.07	890	-0.06	0.03	-0.12	0.01	1.02×10^{1}
EC MD	0.00	890	-0.13	0.03	-0.20	-0.07	3.43×10^{4}
FX MD	0.00	890	-0.11	0.03	-0.17	-0.04	3.91×10^{3}
FXST MD	0.53	890	-0.02	0.03	-0.09	0.04	5.50×10^{1}
PTR MD	0.12	890	-0.05	0.03	-0.12	0.01	1.51×10^{1}
GCC MD	0.00	890	-0.15	0.03	-0.21	-0.09	4.02×10^{5}
BCC MD	0.00	890	-0.11	0.03	-0.18	-0.05	1.73×10^{3}
SCC MD	0.81	890	0.01	0.03	-0.06	0.07	8.08×10^{1}

CGC MD	0.00	890	-0.10	0.03	-0.16	-0.03	8.91×10^{3}
CGH MD	0.46	890	-0.02	0.03	-0.09	0.04	5.33×10^{1}
CST MD	0.53	890	-0.02	0.03	-0.09	0.04	5.50×10^{1}
SFO MD	0.00	890	-0.17	0.03	-0.23	-0.10	1.35×10^{5}
SLF MD	0.00	890	-0.10	0.03	-0.17	-0.04	5.44×10^{3}
SS MD	0.03	890	-0.07	0.03	-0.14	-0.01	4.88×10^{2}
TAP MD	0.10	890	-0.05	0.03	-0.12	0.01	1.32×10^{1}
UNC MD	0.02	890	-0.08	0.03	-0.14	-0.01	4.45×10^{2}

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Pearson's Correlation Coefficient *r***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM AD	0.02	890	-0.08	0.033	-0.146	-0.016	3.75×10^{2}
ACR AD	0.00	890	-0.14	0.033	-0.208	-0.079	9.56×10^{5}
SCR AD	0.00	890	-0.16	0.033	-0.220	-0.091	6.53×10^{5}
PCR AD	0.05	890	-0.06	0.033	-0.129	0.001	1.21×10^{1}
ALIC AD	0.00	890	-0.10	0.033	-0.163	-0.033	1.04×10^{2}
PLIC AD	0.11	890	-0.05	0.033	-0.118	0.012	1.78×10^{1}
RLIC AD	0.24	890	-0.04	0.033	-0.105	0.026	3.51×10^{1}
EC AD	0.00	890	-0.10	0.033	-0.166	-0.036	9.46×10^{3}
FX AD	0.00	890	-0.10	0.033	-0.161	-0.031	1.12×10^{2}
FXST AD	0.42	890	0.03	0.033	-0.038	0.092	5.73×10^{1}
PTR AD	0.70	890	0.01	0.033	-0.052	0.078	7.37×10^{1}
GCC AD	0.00	890	-0.15	0.033	-0.211	-0.082	9.56×10^{5}
BCC AD	0.00	890	-0.10	0.033	-0.166	-0.036	9.46×10^{3}
SCC AD	0.51	890	0.02	0.033	-0.043	0.087	6.29×10^{1}
CGC AD	0.09	890	-0.06	0.033	-0.121	0.009	1.56×10^{1}
CGH AD	0.70	890	0.01	0.033	-0.052	0.078	7.37×10^{1}
CST AD	0.55	890	0.02	0.033	-0.045	0.085	6.35×10^{1}
SFO AD	0.00	890	-0.14	0.033	-0.208	-0.079	9.56×10^{5}
SLF AD	0.08	890	-0.06	0.033	-0.125	0.006	1.39×10^{1}
SS AD	0.76	890	-0.01	0.033	-0.075	0.055	7.58×10^{1}
TAP AD	0.06	890	-0.06	0.033	-0.128	0.002	1.21×10^{1}
UNC AD	0.48	890	-0.02	0.033	-0.089	0.041	6.16×10^{1}

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Pearson's Correlation**	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}

			Coefficient *r*				
Entire WM RD	0.00	890	-0.14	0.03	-0.20	-0.07	2.31×10^{4}
ACR RD	0.00	890	-0.14	0.03	-0.20	-0.07	2.31×10^{4}
SCR RD	0.00	890	-0.12	0.03	-0.19	-0.06	6.06×10^{4}
PCR RD	0.08	890	-0.06	0.03	-0.12	0.01	1.06×10^{1}
ALIC RD	0.00	890	-0.13	0.03	-0.19	-0.07	4.15×10^{4}
PLIC RD	0.04	890	-0.07	0.03	-0.13	0.00	6.06×10^{2}
RLIC RD	0.08	890	-0.06	0.03	-0.12	0.01	1.06×10^{1}
EC RD	0.00	890	-0.13	0.03	-0.20	-0.07	3.21×10^{4}
FX RD	0.00	890	-0.11	0.03	-0.17	-0.04	3.70×10^{3}
FXST RD	0.11	890	-0.05	0.03	-0.12	0.01	1.36×10^{1}
PTR RD	0.01	890	-0.08	0.03	-0.15	-0.02	2.10×10^{2}
GCC RD	0.00	890	-0.13	0.03	-0.19	-0.06	4.21×10^{4}
BCC RD	0.00	890	-0.10	0.03	-0.17	-0.04	3.77×10^{3}
SCC RD	0.72	890	-0.01	0.03	-0.08	0.05	7.23×10^{1}
CGC RD	0.01	890	-0.09	0.03	-0.16	-0.03	1.08×10^{2}
CGH RD	0.14	890	-0.05	0.03	-0.11	0.02	1.57×10^{1}
CST RD	0.14	890	-0.05	0.03	-0.11	0.02	1.57×10^{1}
SFO RD	0.00	890	-0.16	0.03	-0.22	-0.10	3.64×10^{5}
SLF RD	0.00	890	-0.11	0.03	-0.17	-0.04	2.91×10^{3}
SS RD	0.00	890	-0.10	0.03	-0.16	-0.03	8.43×10^{3}
TAP RD	0.19	890	-0.04	0.03	-0.11	0.02	1.97×10^{1}
UNC RD	0.01	890	-0.09	0.03	-0.15	-0.02	1.67×10^{2}

1.10.2 PD participants: Partial correlation between DTI metrics and MDS-UPDRS Part-III (OFF) scores

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Pearson's Correlation Coefficient *r***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM FA	0.00	526	-0.15	0.04	-0.24	-0.07	3.05×10^{3}
ACR FA	0.01	526	-0.12	0.04	-0.20	-0.03	2.01×10^{2}
SCR FA	0.02	526	-0.10	0.04	-0.18	-0.01	3.73×10^{2}
PCR FA	0.02	526	-0.10	0.04	-0.19	-0.02	3.32×10^{2}
ALIC FA	0.10	526	-0.07	0.04	-0.16	0.01	1.18×10^{1}
PLIC FA	0.14	526	-0.06	0.04	-0.15	0.02	1.55×10^{1}
RLIC FA	0.03	526	-0.10	0.04	-0.18	-0.01	3.81×10^{2}

EC FA	0.00	526	-0.15	0.04	-0.23	-0.07	3.05×10^{3}
FX FA	0.00	526	-0.15	0.04	-0.23	-0.06	3.05×10^{3}
FXST FA	0.11	526	-0.07	0.04	-0.15	0.01	1.25×10^{1}
PTR FA	0.00	526	-0.15	0.04	-0.23	-0.07	3.05×10^{3}
GCC FA	0.00	526	-0.16	0.04	-0.24	-0.07	3.05×10^{3}
BCC FA	0.00	526	-0.13	0.04	-0.22	-0.05	8.08×10^{3}
SCC FA	0.02	526	-0.10	0.04	-0.19	-0.02	3.32×10^{2}
CGC FA	0.00	526	-0.13	0.04	-0.21	-0.05	8.12×10^{3}
CGH FA	0.79	526	-0.01	0.04	-0.10	0.07	7.90×10^{1}
CST FA	0.74	526	-0.01	0.04	-0.10	0.07	7.77×10^{1}
SFO FA	0.05	526	-0.09	0.04	-0.17	0.00	5.89×10^{2}
SLF FA	0.04	526	-0.09	0.04	-0.18	-0.01	5.00×10^{2}
SS FA	0.01	526	-0.11	0.04	-0.19	-0.03	2.77×10^{2}
TAP FA	0.02	526	-0.10	0.04	-0.19	-0.02	3.32×10^{2}
UNC FA	0.02	526	-0.10	0.04	-0.19	-0.02	3.32×10^{2}

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Pearson's Correlation Coefficient *r***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM MD	0.70	526	0.02	0.04	-0.07	0.10	9.65×10^{1}
ACR MD	0.08	526	0.08	0.04	-0.01	0.16	3.33×10^{1}
SCR MD	0.84	526	-0.01	0.04	-0.09	0.08	9.70×10^{1}
PCR MD	0.66	526	0.02	0.04	-0.07	0.10	9.65×10^{1}
ALIC MD	0.31	526	-0.04	0.04	-0.13	0.04	6.89×10^{1}
PLIC MD	0.05	526	-0.08	0.04	-0.17	0.00	3.33×10^{1}
RLIC MD	0.83	526	-0.01	0.04	-0.09	0.08	9.70×10^{1}
EC MD	0.61	526	0.02	0.04	-0.06	0.11	9.65×10^{1}
FX MD	0.06	526	0.08	0.04	0.00	0.16	3.33×10^{1}
FXST MD	0.97	526	0.00	0.04	-0.08	0.09	9.70×10^{1}
PTR MD	0.92	526	0.00	0.04	-0.08	0.09	9.70×10^{1}
GCC MD	0.15	526	0.06	0.04	-0.02	0.15	4.26×10^{1}
BCC MD	0.96	526	0.00	0.04	-0.09	0.08	9.70×10^{1}
SCC MD	0.07	526	-0.08	0.04	-0.16	0.01	3.33×10^{1}
CGC MD	0.24	526	-0.05	0.04	-0.14	0.03	5.94×10^{1}
CGH MD	0.12	526	-0.07	0.04	-0.15	0.02	4.24×10^{1}
CST MD	0.02	526	-0.10	0.04	-0.18	-0.02	3.33×10^{1}

SFO MD	0.42	526	0.04	0.04	-0.05	0.12	8.39×10^{1}
SLF MD	0.92	526	0.00	0.04	-0.08	0.09	9.70×10^{1}
SS MD	0.62	526	0.02	0.04	-0.06	0.11	9.65×10^{1}
TAP MD	0.14	526	0.06	0.04	-0.02	0.15	4.26×10^{1}
UNC MD	0.48	526	-0.03	0.04	-0.12	0.05	8.76×10^{1}

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Pearson's Correlation Coefficient *r***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM AD	0.02	526	-0.10	0.04	-0.18	-0.01	7.76×10^{2}
ACR AD	0.89	526	0.01	0.04	-0.08	0.09	8.90×10^{1}
SCR AD	0.21	526	-0.05	0.04	-0.14	0.03	3.54×10^{1}
PCR AD	0.39	526	-0.04	0.04	-0.12	0.05	4.71×10^{1}
ALIC AD	0.06	526	-0.08	0.04	-0.17	0.00	1.38×10^{1}
PLIC AD	0.02	526	-0.10	0.04	-0.19	-0.02	6.96×10^{2}
RLIC AD	0.17	526	-0.06	0.04	-0.14	0.02	3.03×10^{1}
EC AD	0.08	526	-0.08	0.04	-0.16	0.01	1.62×10^{1}
FX AD	0.37	526	0.04	0.04	-0.05	0.12	4.71×10^{1}
FXST AD	0.28	526	-0.05	0.04	-0.13	0.04	4.18×10^{1}
PTR AD	0.02	526	-0.10	0.04	-0.18	-0.01	7.76×10^{2}
GCC AD	0.37	526	-0.04	0.04	-0.12	0.05	4.71×10^{1}
BCC AD	0.03	526	-0.09	0.04	-0.18	-0.01	8.02×10^{2}
SCC AD	0.00	526	-0.12	0.04	-0.21	-0.04	4.11×10^{2}
CGC AD	0.00	526	-0.12	0.04	-0.21	-0.04	4.11×10^{2}
CGH AD	0.04	526	-0.09	0.04	-0.18	-0.01	8.91×10^{2}
CST AD	0.01	526	-0.12	0.04	-0.20	-0.04	4.11×10^{2}
SFO AD	0.81	526	-0.01	0.04	-0.10	0.07	8.88×10^{1}
SLF AD	0.29	526	-0.05	0.04	-0.13	0.04	4.18×10^{1}
SS AD	0.41	526	-0.04	0.04	-0.12	0.05	4.71×10^{1}
TAP AD	0.88	526	0.01	0.04	-0.08	0.09	8.90×10^{1}
UNC AD	0.01	526	-0.11	0.04	-0.19	-0.02	6.96×10^{2}

Total PD & Controls	***p*-value**	**Degrees of Freedom**	**Pearson's Correlation Coefficient *r***	**Standard Error**	**Lower CI**	**Upper CI**	p_{FDR}
Entire WM	0.02	526	0.10	0.04	0.02	0.19	9.89×10^{2}

RD							
ACR RD	0.01	526	0.11	0.04	0.03	0.20	9.89×10^{2}
SCR RD	0.37	526	0.04	0.04	-0.05	0.12	4.27×10^{1}
PCR RD	0.18	526	0.06	0.04	-0.03	0.14	3.23×10^{1}
ALIC RD	0.86	526	0.01	0.04	-0.08	0.09	9.01×10^{1}
PLIC RD	0.90	526	-0.01	0.04	-0.09	0.08	9.01×10^{1}
RLIC RD	0.30	526	0.05	0.04	-0.04	0.13	4.13×10^{1}
EC RD	0.04	526	0.09	0.04	0.01	0.18	9.89×10^{2}
FX RD	0.03	526	0.09	0.04	0.01	0.18	9.89×10^{2}
FXST RD	0.22	526	0.05	0.04	-0.03	0.14	3.41×10^{1}
PTR RD	0.03	526	0.09	0.04	0.01	0.18	9.89×10^{2}
GCC RD	0.00	526	0.14	0.04	0.05	0.22	3.38×10^{2}
BCC RD	0.03	526	0.09	0.04	0.01	0.18	9.89×10^{2}
SCC RD	0.23	526	0.05	0.04	-0.03	0.14	3.41×10^{1}
CGC RD	0.16	526	0.06	0.04	-0.02	0.14	3.23×10^{1}
CGH RD	0.55	526	-0.03	0.04	-0.11	0.06	6.07×10^{1}
CST RD	0.22	526	-0.05	0.04	-0.14	0.03	3.41×10^{1}
SFO RD	0.14	526	0.06	0.04	-0.02	0.15	3.01×10^{1}
SLF RD	0.33	526	0.04	0.04	-0.04	0.13	4.26×10^{1}
SS RD	0.11	526	0.07	0.04	-0.02	0.15	2.80×10^{1}
TAP RD	0.04	526	0.09	0.04	0.01	0.18	9.89×10^{2}
UNC RD	0.35	526	0.04	0.04	-0.04	0.12	$4.27E \times 10^{1}$

2. Supplementary Methods

Supplementary Figure 35: World Map showing location of sites included in this study. Data were also included that came from the PPMI (https://www.ppmi-info.org/) and UK Biobank (https://www.ukbiobank.ac.uk/) which are large multi-site studies.

2.1 Inclusion and Exclusion Criteria

Site	Diagnostic Criteria	Inclusion Criteria		Exclusion Criteria	
		Controls	PD	Controls	PD
Amsterdam	UKBB	Sex and age-matched control	Patients seen at the movement disorders outpatient clinic.	-	-
Campinas	UKBB	-	Idiopathic PD, taking antiparkinsonian medications, age > 30 years.	-	Clinically significant musculoskeletal, cardiovascular, respiratory or other neurological disease.
Chang Gung	NINDS	Aged between 50-90.	Diagnosis of probable PD, ability to tolerate treatment discontinuation for 12 hours.	Major physical illnesses, psychiatric disorders, known brain abnormalities, history of intracranial surgery, pharmacotherapy for more than ten years or treatment with drugs able to cross the blood-brain-barrier (other than those used to	Major physical illnesses, psychiatric disorders, known brain abnormalities, history of intracranial surgery, pharmacotherapy for more than ten years or treatment with drugs able to cross the blood-brain-barrier (other than those used to

				treat PD).	treat PD).
Christchurch	UKBB	-	Met the UK Parkinson's Society criteria for PD, motor symptoms present for at least 1 year at study entry.		Atypical parkinsonian disorder, history of moderate/severe head injury, stroke, early-life learning disability, major psychiatric or medical illness in the previous 6 months, poor English (precluding testing).
Cogtips	UKBB	Sex, age, and education-matched.	Subjective cognitive complaints (PD-CFRS > 3), HY stage < 4.	Neurological disease, indication of dementia (MoCA < 22), indication of psychotic (SAPS-PD) or depressive disorder (BDI > 18), drugs and/or alcohol abuse, inability to undergo neuropsychological assessment, traumatic brain injury, tumor or vascular abnormalities.	Dementia (SAGE <14 or MoCA < 22), drugs or alcohol abuse (CAGE AID > 1), depressive symptoms (BDI > 18), impulse control disorder (ICD criteria interview), psychotic symptoms (SAPS-PD criteria), tumors and significant vascular abnormalities.
Graz	QSBB	No history of previous stroke or dementia and a normal neurologic examination.	Clinical diagnosis of PD.	-	MMSE <24, secondary parkinsonism, atypical parkinsonian diseases, a history of neuroleptic drugs, structural abnormalities on routine MRI scans or a history of previous stroke.
NWE	UKBB	Age-matched to PD group and without a history of idiopathic PD or clinical CVD, or any other significant neurological condition.	PD diagnosis without known clinical cardiovascular disease or dementia. No other significant neurological conditions.	-	-
Oxford	UKBB	-	PD diagnosis within the past 3.5 years. Full details of criteria are available at: Szewczyk-Krolikowski K et. al. (2013).	Controls without blood relatives with PD.	No atypical features to suggest an alternative diagnosis. No secondary parkinsonism due to head trauma or medication use, atypical parkinsonism syndromes (multiple system atrophy, progressive supra nuclear palsy, corticobasal degeneration, dementia with Lewy

					bodies), documented postural BP drop on standardized measurement or significant urinary symptoms.
PPMI	MDS	https://www.ppmi-info.org/sites/default/files/docs/PA2 PPMI Clinical%20Protocol Final 01Feb2021.pdf	https://www.ppmi-info.org/sites/default/files/docs/PA2 PPMI Clinical%20Protocol Final 01Feb2021.pdf	https://www.ppmi-info.org/sites/default/files/docs/PA2 PPMI Clinical%20Protocol Final 01Feb2021.pdf	https://www.ppmi-info.org/sites/default/files/docs/PA2 PPMI Clinical%20Protocol Final 01Feb2021.pdf
Radboud	UKBB	Same age/gender balance as PD patients	Idiopathic PD, UPDRS tremor-score > 2, dopaminergic therapy with a clear clinical response of non-tremor symptoms (bradykinesia, rigidity), HY stage 1-3.	Neurological or psychiatric disease, cognitive impairment (MMSE < 26), medication associated with elongated QT-time, pregnancy, age < 25 years.	Neurological or psychiatric comorbidity, severe head tremor or dyskinesias, cognitive impairment (MMSE < 26), co-medication associated with elongated QT-time, pregnancy, age < 25 years.
Rome SLF	MDS	Vision and hearing sufficient for compliance with testing procedures, laboratory values within normal reference intervals, neuropsychological domain scores above normal cognitive level cutoff scores, corrected for age and educational level.	Diagnosis of idiopathic, MMSE score > 26, no dementia.	Dementia or MCI diagnosis, confirmed by a comprehensive neuropsychological battery, MMSE score<26, presence of major non-stabilized medical illnesses, known or suspected history of alcoholism, drug dependence and abuse, head trauma, and mental disorders (apart from mood or anxiety disorders).	Presence of major non-stabilized medical illnesses, known or suspected history of alcoholism, drug dependence and abuse, head trauma, and mental disorders (apart from mood or anxiety disorders), history of neurological diseases other than idiopathic PD, unclear history of chronic dopaminergic treatment responsiveness.
Stanford	UKB	Normal neurological exam and normal neuropsychiatric battery (within 1.5 SD of age- and education- adjusted norms).	> 20% improvement on MDS-UPDRS part III ON medication compared to OFF medication.	-	-
Stellenbosch	MDS	No current or lifetime history of any DSM-5 psychiatric disorder	Diagnosis of PD by neurologist , age > 40 years and <= than 75 years. Exclusion: Any significant medical/physical illness (other than PD), participants with metal prostheses, cardiac pacemakers or metal clips likely to interfere with ability	Neurological conditions that would preclude completion of neurocognitive tasks, current or lifetime daily psychotropic medication use.	-

			to acquire MR image		
UCSF	MDS	-	Ages 40 to 85; Diagnosis of Parkinson's disease and mild to moderate symptoms defined by a Hoehn and Yahr score of 1.0 to 3.0; Diagnosis of a movement disorder with Parkinsonian symptoms, including but not limited to multiple system atrophy.	Any contra-indication for undergoing MRI, Abnormal MRI findings. History of encephalitis, multiple sclerosis, other CNS infection, epilepsy, or primary CNS disease besides PD, loss of consciousness for more than 2 minutes; clinical diagnosis of dementia, as indicated by clinical interview. Inability to give informed consent.	Any contra-indication for undergoing MRI, Abnormal MRI findings. History of encephalitis, multiple sclerosis, other CNS infection, epilepsy, or primary CNS disease besides PD, loss of consciousness for more than 2 minutes; clinical diagnosis of dementia, as indicated by clinical interview. Inability to give informed consent.
UKBiobank		Age 40-69 years at recruitment. Capacity to consent. Lived within 20-25 miles of one of the assessment centres.	Age 40-69 years at recruitment. Capacity to consent. Lived within 20-25 miles of one of the assessment centres.	-	-
Pennsylvania	UKBB	>40 years of age, MMSE > 27, a negative self-reported history of neurological or psychiatric condition, and MRI safe (e.g., no metal, claustrophobia).	Clinical diagnosis of PD.	-	-
Charlottesville	Neurologist	-	PD diagnosis with a motor symptom that is not (or inconsistently) responsive to oral medication.	-	-
Supplementary Table 2: Inclusion and exclusion criteria used to enroll participants at each site. **Abbreviations:** UKB, United Kingdom Brain Bank; MDS, Movement Disorder Society clinical diagnostic criteria for Parkinson's disease					

2.2 Study Participants

The following Institutional Review Board approvals were granted for each respective site that contributed data to this project: Amsterdam, Medisch Ethische Toetsingscommissie VU Medisch Centrum approval #ID2018.198; Campinas, Comitê de Ética de Pesquisa da UNICAMP; approval #CAAE: 45873415.9.0000.5404; Chang Gung, Chang Gung Medical Foundation Institutional Review Board #202001592B0; Charlottesville, University of Virginia Institutional Review Board for Health Science Research #16778; Christchurch, Southern Health and Disability Ethics Committee of the New Zealand Ministry of Health #URB/09/08/037/AM07; COGTIPS, METc VUmc #NL58750.029.16 (2016.543); Graz, Ethics Committee of the Medical University of Graz #21-345-ex 09/10 and IRB: Medical University of Graz PROMOVE 21-345 ex 09/10 ASPSF: 17-088 ex 05/06; NWE, ethics (North West – Preston Research Ethics Committee) IRAS ID #122770 REC reference 13/NW/0295; Oxford,

South-Central Oxford Research Ethics Committee #15/SC/0117; Pennsylvania, University of Pennsylvania Institutional Review Board Protocol #820710; Radboud, METC Oost-Nederland #2014-123 and CMO Regio Arnhem - Nijmegen NL47614.091.14. METC 2014/014; Rome, Fondazione Santa Lucia Local Istitutional Review Board. Approval ID #CE/PROG.905; Stanford, The MJFF MRI study (IRB-22722) and the ADRC study (IRB-33727); Stellenbosch, approved by IRBs at Stellenbosch University (IRB reference number: M07/05/019) and the University of Cape Town (IRB reference number: 261/2007); UCSF, UCSF IRB #: 10-00413.

2.3 MRI Acquisition

Site	Scanner Manufacturer (Model)	(T)	Acq.	Slices	Voxel sizes (mm3)	Voxel vols (mm3)	Dirs	*b*	Shells	b=0 scans	TE (ms)	TR (ms)
Amsterdam	GE Signa HDxT	3T	Axial	49-51	2 x 2 x 2.4	9.60	30	1000	1	5	85	14000
Campinas	Philips Achieva	3T	Axial	70	2 x 2 x 2	8.00	32	1000	1	1	61	8500
Chang Gung	Siemens TrioTim	3T	Axial	64	2 x 2 x 2	8.00	64	1000	1	-	96	8299
Christchurch	GE HDxt	3T	Axial	48	1.875 x 1.875 x 3	10.55	28	1000	1	4	86	13000
Cogtips	General Electric	3T	Axial	56	2.5 x 2.5 x 2.5	15.63	24	1000	1	7	81	7350
Graz	Siemens TrioTim	3T	Axial	50	1.95 x 1.95 x 2.5	9.51	12	1000	1	1	95	6700
NWE	Philips Achieva	3T	Axial	30	1.8 x 1.8 x 5	16.15	7	1000	1	1	68	3000
Oxford	Siemens Trio Tim	3T	Axial	60	2 x 2 x 2	8.00	60	1000	1	5	94	9300
PPMI	Siemens TrioTim	3T	-	72	2 x 2 x 2	8.00	65	1000	1	1	90	8000
Radboud	Siemens Skyra	3T	-	64	2.2 x 2.2 x 2.2	10.65	68	1000	1	8	89	8200
Rome	Siemens Allegra	3T	Axial	80	1.8 x 1.8 x 1.8	5.83	30	1000	1	2	89	8500
Stanford	GE	3T	-	63	0.85 x 0.85 x 2	1.45	26	1000	1	1	2	6
Stellenbosch	Siemens Skyra	3T	T > C8.0 > S1.8	70	2 x 2 x 2	8.00	30	1000	1	1	92	9800
UCSF	Siemens Skyra	3T	Sagittal	61	2 x 2 x 2	8.00	65	1000	1	1	73	7900
UK Biobank	Siemens Skyra	3T	Axial	72	2 x 2 x 2	8.00	50	1000	1	5	92	3600
UPenn	Siemens TrioTim	3T	-	57-70	1.8 x 1.8 x 1.8	5.83	35	1000	1	5	56-100	6500-11500
UVA	Siemens TrioTim; Skyra	3T	Axial	30-55	1.8 x 1.8 x 1.8	5.83	60-80	1000	1	1-4	67-109	3640-10900

Supplementary Table 3: Diffusion MR imaging acquisition parameters for each site. **Abbreviations:** Dirs, gradient directions;

Site	Diffusion MRI Processing Steps per Site	Number of Subjects Excluded via QC
Amsterdam	Diffusion MRI data were preprocessed using FMRIB Software Library to correct for motion and eddy-currents. FSL-DTIFIT was used to generate FA, MD, AD and RD maps (FSL v5.0.8).	0
Campinas	Diffusion-weighted images were preprocessed with MP-PCA denoising, followed by Gibbs-de-ringing using MRtrix3 (Tournier et al. 2019). SynB0 was then used to synthesize an "undistorted" b=0 image that matches the geometry of structural T1w images (Schilling et al. 2019) which was then used with FSL TOPUP to correct for EPI susceptibility induced distortions. Images were then corrected for Eddy current and movement distortions using FSL-Eddy, followed by a correction for B1 field inhomogeneity. A diffusion tensor model was then fitted at each voxel, generating DTI maps (FSL v6.0.3).	1
Chang Gung	Diffusion-weighted images were preprocessed with MP-PCA denoising, followed by Gibbs-de-ringing using MRtrix3 (Tournier, et al., 2019). SynB0 was then used to synthesize an "undistorted" b=0 image that matches the geometry of structural T1w images (Schilling et al., 2019) which was then used with FSL TOPUP to correct for susceptibility induced distortions. Images were then corrected for Eddy current and movement distortions using FSL-Eddy, followed by a correction for B1 field inhomogeneity. A diffusion tensor model was then fitted at each voxel, generating DTI maps (FSL v6.0.3).	5
Christchurch	Diffusion-weighted images were motion- and eddy current distortion–corrected (FSL v4.1.6). The diffusion tensor was then calculated at each voxel using DTIFIT, producing FA, MD, AD and RD maps (www.fmrib.ox.ac.uk/fsl)	8
Cogtips	Diffusion images were denoised using the dwidenoise tool in MRtrix3 (Tournier et al., 2019) and subsequently processed using EDDY (Andersson and Sotiropoulos 2016) in FMRIB Software Library (FSL) version 6.0.1. We used EDDY QC for quality assessment (Bastiani et al. 2019) and additionally calculated the median sum of squared error of the b1000 tensor fit. These image quality measures were compared across time and groups using the nparLD package in R (version 4.0.2). DWI volumes were visually inspected for residual motion-related artifacts and deleted if necessary. Scans were excluded in case of > 3 volumes per shell with motion artifacts. We used FSL DTI-FIT to fit the tensor to the b = 1000 s/mm2 data to determine FA, MD, AD, and radial RD.	3
Graz	Diffusion-weighted images were preprocessed with MP-PCA denoising, followed by Gibbs-de-ringing using MRtrix3 (Tournier, et al., 2019). Images were then corrected for Eddy current and movement distortions using FSL-Eddy, followed by a correction for B1 field inhomogeneity. A diffusion tensor model was then fitted at each voxel, generating DTI maps (FSL v6.0.3).	19
NWE	Diffusion MR images were preprocessed using PreQual (https://github.com/MASILab/PreQual), including denoising, de-ringing, FSL-Topup with Synb0-DisCo (Schilling et al., 2019) and FSL-Eddy. FSL's eddy_correct and fdt_rotate_bvecs were then used to correct the eddy current-related artefacts that Eddy failed to correct due to the small number of non-zero bvecs (although Eddy did apply the Topup unwarping), which seems to have worked well. Negative	1

	values in the corrected DWI data, introduced by interpolation effects, were replaced with a small positive value. FSL's DTIFIT was then fit the diffusion tensor to every voxel in the brain mask and obtain DTI-derived maps including MD, FA, AD and RD.	
Oxford	B0 inhomogeneity for diffusion imaging was measured using a dual-echo GRE sequence and the resulting phase and magnitude images were processed to produce field maps for correction of inhomogeneity-induced distortions. Correction for b0-associated and eddy current-related distortion, as well as participant's movement, were performed using EDDY (Bastiani et al., 2019). EDDY uses a generative probabilistic model to estimate intervolume and intravolume movements, displacements caused by field inhomogeneity, and distortions caused by eddy currents induced by the diffusion gradients. Additionally, automatic artefact rejection replaces slice drop-outs with model estimates (Andersson and Sotiropoulos 2016; Andersson et al. 2017) The resultant 4D diffusion data were then fed into dtifit, which fits a diffusion tensor model at each voxel (Basser, Mattiello, and LeBihan 1994; Pierpaoli et al. 1996).	0
PPMI	Diffusion-weighted images were preprocessed with MP-PCA denoising, followed by Gibbs-de-ringing using MRtrix3 (Tournier et al. 2019). SynB0 was then used to synthesize an "undistorted" b=0 image that matches the geometry of structural T1w images (Schilling et al. 2019) which was then used with FSL TOPUP to correct for EPI susceptibility induced distortions. Images were then corrected for Eddy current and movement distortions using FSL-Eddy, followed by a correction for B1 field inhomogeneity. A diffusion tensor model was then fitted at each voxel, generating DTI maps (FSL v6.0.3).	0
Radboud	Diffusion-weighted data were preprocessed using the Donders Institute Diffusion Imaging toolbox (https://github.com/marcelzwiers/ ; didi). Raw data were denoised through overcomplete local principal component analysis. Signal dropout due to cardiac and head motion were corrected using the PATCH method. Scans were corrected for signal distortions resulting from eddy currents and subject motion, including rotation of b vectors.	0
Rome SLF	DTI images were processed using FSL. First, they were corrected for the distortion induced by eddy currents and head motions (fsl eddy_correct) applying a 3D full affine alignment of each image to the mean b0 image. After distortion corrections, DTI data were averaged, concatenated into 31 (1 b0+30 b1000) volumes. A diffusion tensor model was fitted (fsl dtifit) at each voxel and it generated FA, AD and RD maps.	0
Stanford	Diffusion-weighted images were preprocessed with MP-PCA denoising, followed by Gibbs-de-ringing using MRtrix3 (Tournier et al. 2019). SynB0 was then used to synthesize an "undistorted" b=0 image that matches the geometry of structural T1w images (Schilling et al. 2019) which was then used with FSL TOPUP to correct for EPI susceptibility induced distortions. Images were then corrected for Eddy current and movement distortions using FSL-Eddy, followed by a correction for B1 field inhomogeneity. A diffusion tensor model was then fitted at each voxel, generating DTI maps (FSL v6.0.3).	0
Stellenbosch	Diffusion-weighted images were processed using TORTOISE (Tolerably Obsessive Registration and Tensor Optimization Indolent Software Ensemble) (Irfanoglu et al. 2017; Pierpaoli et al. 2010). Firstly, each anterior-posterior and posterior-anterior encoded image was processed for motion, eddy currents, and echo-planar	0

	imaging (EPI) distortions using the DIFF PREP module. Secondly, encoded sets were merged, and further EPI distortion corrections applied with the DR-BUDDI module (Irfanoglu et al. 2015). Diffusion tensor parameter fitting was performed with the DIFF-CALC module generating FA, MD, AD and RD maps (Pierpaoli et al. 2010).	
UCSF	Diffusion-weighted images were preprocessed with MP-PCA denoising, followed by Gibbs-de-ringing using MRtrix3 (Tournier et al. 2019). SynB0 was then used to synthesize an "undistorted" b=0 image that matches the geometry of structural T1w images (Schilling et al. 2019) which was then used with FSL TOPUP to correct for EPI susceptibility induced distortions. Images were then corrected for Eddy current and movement distortions using FSL-Eddy, followed by a correction for B1 field inhomogeneity. A diffusion tensor model was then fitted at each voxel, generating DTI maps (FSL v6.0.3).	1
UKBiobank	Preprocessing consisted of correction for eddy currents, head motion, and outlier slices using FSL's Eddy tool, followed by gradient distortion correction(Alfaro-Almagro et al. 2018).	0
Pennsylvania	Diffusion-weighted images were preprocessed with MP-PCA denoising, followed by Gibbs-de-ringing using MRtrix3 (Tournier, et al., 2019). Images were then corrected for Eddy current and movement distortions using FSL-Eddy, followed by a Bias field correction (FSL v6.0.3). Finally, a diffusion tensor model was fitted at each voxel, generating DTI maps (FSL v6.0.3).	8
Charlottesville	Diffusion-weighted images were preprocessed with MP-PCA denoising, followed by Gibbs-de-ringing using MRtrix3 (Tournier, et al., 2019). Images were then corrected for Eddy current and movement distortions using FSL-Eddy, followed by a Bias field correction (FSL v6.0.5). Finally, a diffusion tensor model was fitted at each voxel, generating DTI maps (FSL v6.0.5).	2

Supplementary Table 4: Steps used by each site to process diffusion MRI data, and number of subjects excluded at each site due to not passing quality control.

2.4 Effect Sizes

For between-group effects, we used a partial Cohen's *d* effect sizes calculated for each regions-of-interest based on the estimated marginal means (after adjusting for covariates),

$$d = \frac{t(n_1 + n_2)}{\sqrt{n_1 n_2}\sqrt{df}}$$

where *t* is t-value from the between-group comparison, n_1 and n_2 are the numbers of observations in each group, and *df* is the degrees of freedom. Values were interpreted according to the following criteria: small *d* = 0.20–0.49; medium *d* = 0.50–0.79; large *d* ≥ 0.8 (Cohen 1988). For between-group analyses throughout the text and figures, positive effect size values correspond to PD patients having higher values than controls, whereas negative effect size values correspond to PD participants having lower values relative to controls. We also show the precision of these effect size estimates using confidence intervals calculated as 95% CI = *d* ± 1.96 × *se*, where *d* represents the effect size and *se* is the asymptotic standard error for the effect size (Nakagawa and Cuthill 2007). For within-group investigations of the association between DTI metrics and clinical variables, Pearson partial correlation coefficients

$$r = \frac{t}{\sqrt{t^2 + df}}$$

are used to represent the directionality and strength of the association, where *t* is the value of the t-test and *df* is the degrees of freedom.

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