

myelin sheaths.

•Here, we report results from youth comparing DTI, NODDI, and qR1 metrics.

Methods

- •Multi-shell diffusion-weighted and T1-weighted MPnRAGE images were collected in 22 females (M=10.2y).
- •B-values = 100, 1000, 2000
- •DWI data were analyzed with QSIPrep and QSIRecon
- •Longitudinal relaxation rates were derived from MPnRAGE images
- •Inter-modality Pearson correlations (p<0.01) were examined among diffusion weighted metrics (fractional anisotropy-FA, NDI, ODI) and longitudinal relaxation rates (qR1) for five ROIs from the JHU WM atlas (UF, CC, CING, SLF, IC). •Uncinate fasciculus (UF), corpus callosum

Results

- NODDI metric.
- •FA, a global measure of WM integrity, was positively (mean-r=0.72) and negatively (meanr=-0.78) associated with NDI and ODI,
- •NDI and ODI were uncorrelated.
- correlation (mean-r=0.39, p<0.1).

Discussion

- •DTI and NODDI measures were moderately correlated, suggesting that they likely capture distinct but related biophysical properties of WM dynamics.
- •qR1 was unrelated to any DWI metric, is thought to be specific to myelination, and does not rely on water diffusion.
- •Future studies will leverage these modalities to investigate how different components of WM microarchitecture may be altered in childhood psychopathologies.

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Full Inter-modality WM Metric Correlations (R-values)

| | UF | CC | CING | IC | SLF |
|---------|-------|-------|-------|-------|-----|
| FA-R1 | | | | | |
| FA-NDI | 0.72 | 0.79 | | 0.65 | 0.7 |
| FA-ODI | -0.88 | -0.73 | -0.8 | | -0 |
| | | | | | |
| RD-R1 | -0.58 | | | | |
| RD-NDI | -0.94 | -0.95 | -0.94 | -0.89 | -0. |
| RD-ODI | | | | | |
| | | | | | |
| R1-NDI | 0.55 | | | | |
| R1-ODI | | | | | |
| | | | | | |
| NDI-ODI | | | | | |



DTI and NODDI metrics are correlated and likely capture

- distinct but related properties of WM microstructure, while
- **R1**, more specific to myelination, **is unrelated** to either.

DTI – R1 Correlations in a Sample of Infant Rhesus Macaques







https://www.sciencedirect.com/science/article/pii/S2667174322000064 https://www.nature.com/articles/s42254-021-00326-1