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Supplemental Information

Patterns of Coordinated Anatomical Change in Human Cortical Development: A Longitudinal Neuroimaging Study of Maturational Coupling

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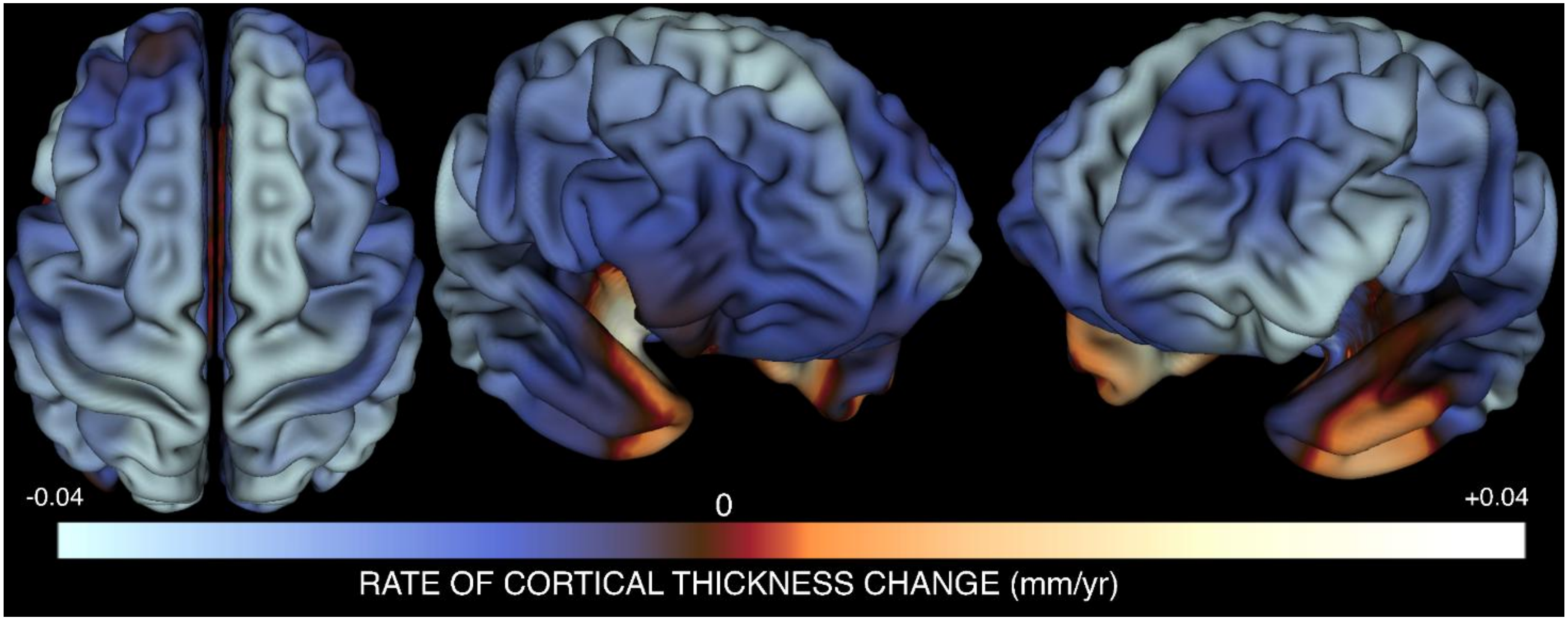

FIGURE S1

Mapping the Mean Rate of Cortical Thickness (CT) Change per Year Between Ages 9 and 22 Years Using Mixed Models. Three views of the cortical sheet are shown. Colors represent the magnitude of mean annual CT change within our sample at each vertex. There is almost perfect agreement between these maps and those presented in our main paper, which estimate group-mean CT change at each vertex by averaging person-specific maps of CT change (**Figure 1**). Thus, transforming repeated measures of CT into person-specific maps of CT change preserves group-level descriptions of CT change as derived by traditional mixed-models.

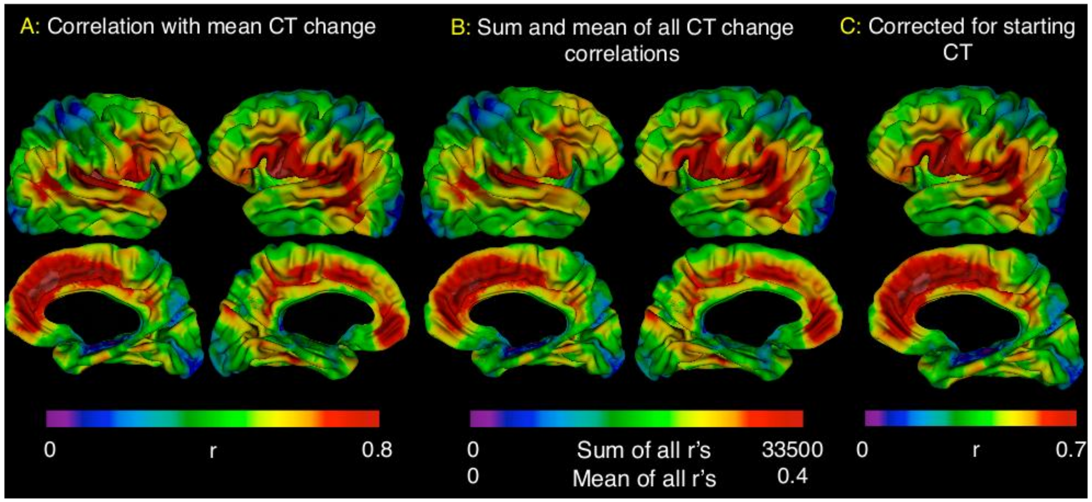

FIGURE S2

(A-C) Regional Differences in Correlation With Rates of Cortical Thickness (CT) Change Throughout the Cortical Sheet. A) A map of correlation strength between CT change at each vertex and mean CT change across all vertices. This map is identical to that in **Figure 2A**, except that no r-value threshold has been applied. Calculating the values in this map requires computation of approximately 82,000 correlations, and takes 30 seconds. **B)** Results of a computationally expensive approach to mapping regional differences in maturational coupling. Using this computationally expensive approach, the relationship between CT change at each vertex and that at all other vertices, can be represented as the sum or mean of approximately 82,000 correlations coefficients. Although this method identifies exactly the same regional variation in maturational coupling with CT change throughout the cortex as is shown in **Supplementary Figure 2A**, it requires computation of approximately 3 billion correlations and takes 6 days to complete. Because **Figure 2A/Supplementary Figure 2A** and **Supplementary Figure 2B** provide the same information about regional differences in maturational coupling within the cortical sheet, we focus in our main paper on the more computationally efficient and interpretable metric presented in **Figure 2A/Supplementary Figure 2A**. **C)** Map of the correlation between CT change at each vertex and mean CT change across all vertices – calculated after re-expressing CT change at each vertex as a proportion of absolute CT. Because this map replicates that shown in **Supplementary Figure 2A,** the convergence we report between maps of correlated CT change and previously published maps of cross-sectional CT correlations (reproduced in **Figure 2C**) cannot be a statistical artifact of occult relationships between inter-individual differences in cross-sectional CT and inter-individual differences in the rate of CT change.

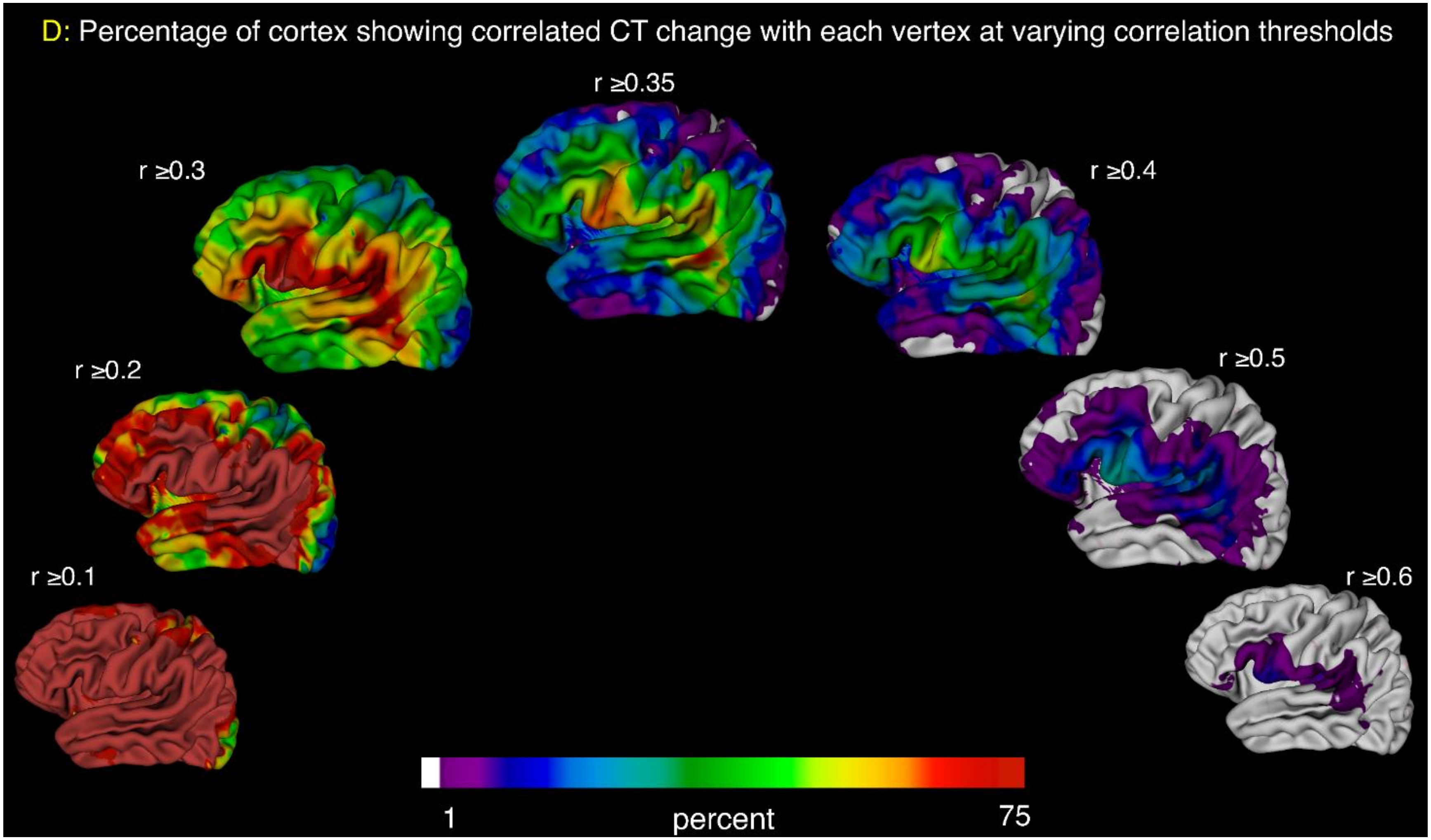

FIGURE S2D. The left lateral view of Supplementary Figure 2B is reproduced across a range of r thresholds.

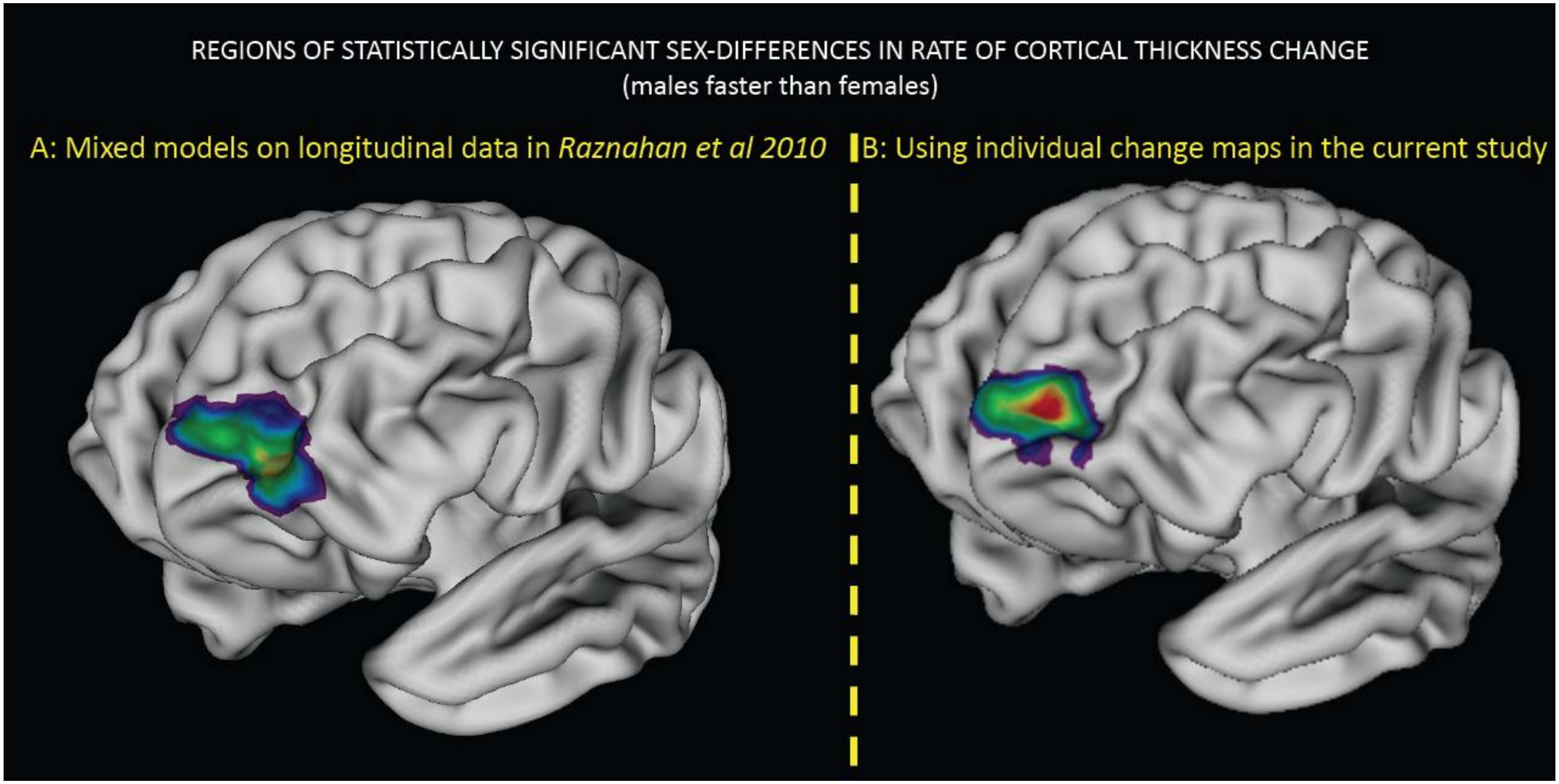

FIGURE S3

Statistically Significant Sex Differences in Rate of CT Change Within the left Frontopolar Cortex (lFPC). A) A previously published (Raznahan et al., 2010a) map of significant sex-differences in rate of CT change between 9 and 22 years derived using traditional mixed models on 789 longitudinally acquired structural magnetic resonance imaging (sMRI) scans. **B)** Statistically significant sex differences in CT change identified in the current study using person-specific maps of CT change. There is good agreement between these two images despite the use of different approaches to model sex-differences in CT change, and the fact that there is only 28% overlap in the sMRI scans used in each analysis. Because of this clear convergence on the lFPC – we selected the peak lFPC vertex from **Supplementary Figure 4B** for use as a seed to examine sexually dimorphic maturational coupling within the cortical sheet (**Figure 4**).