



Figures and figure supplements

Default mode-visual network hypoconnectivity in an autism subtype with pronounced social visual engagement difficulties

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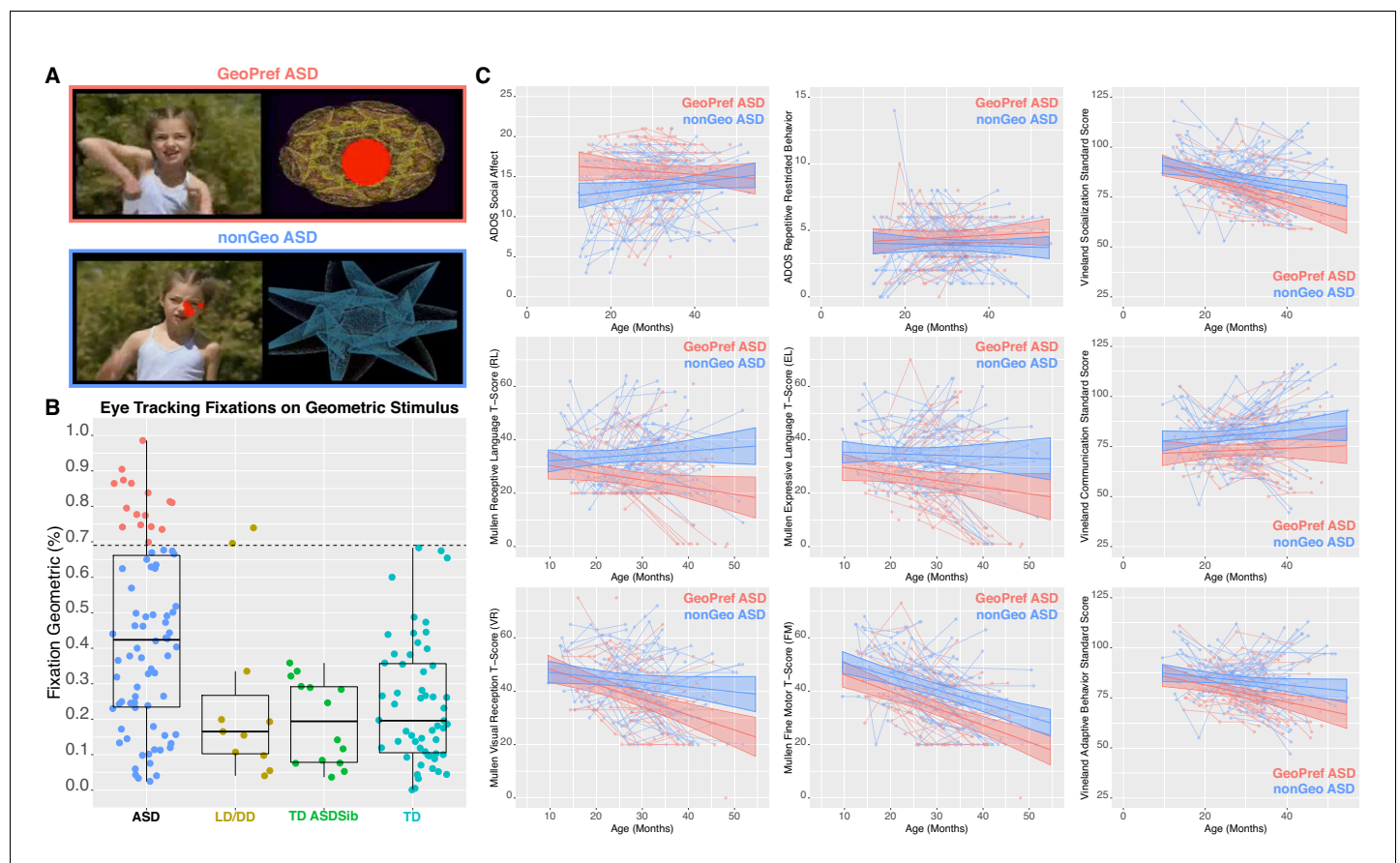


Figure 1. Identification of the GeoPref ASD subtype and behavioral differentiation in ASD symptoms, verbal, non-verbal, and adaptive behavior domains. Panel A shows examples of the stimuli used in the GeoPref eye tracking test as well as example fixations from a GeoPref ASD individual (pink), and a nonGeo ASD individual (blue). The red dots superimposed on the stimulus show visual fixations and the size of the red dots indicate fixation duration. Panel B shows a scatter-boxplot of eye tracking data on the GeoPref test for subjects who also had rsfMRI data available (GeoPref ASD, $n = 16$, pink; nonGeo ASD, $n = 62$, blue; language/developmental delay, LD/DD, $n = 15$ yellow; typically developing siblings of ASD individuals, TD ASDSib, $n = 16$ green; typically developing toddlers, $n = 55$, turquoise). The middle line of the boxplot represents the median. The box boundaries represent the interquartile range (IQR; $Q1 = 25^{\text{th}}$ percentile, $Q3 = 75^{\text{th}}$ percentile), while the whiskers indicate the distance of $1.5 \times \text{IQR}$. Percentage of time fixating on the geometric visual stimulus is plotted on the y-axis and group membership is plotted on the x-axis. The cutoff threshold of 69% is noted as the dashed line. GeoPref ASD toddlers (pink) fall above the cutoff, while all other ASD toddlers (nonGeo ASD; blue) fall below the cutoff. Panel C depicts individual and group-level developmental trajectories for longitudinal data from GeoPref ASD ($n = 60$, pink) or nonGeo ASD ($n = 62$, blue) on ADOS, Mullen Early Scales of Learning, and Vineland Adaptive Behavior subscales. All measures show a significant main effect of subtype passing $\text{FDR } q < 0.05$. Mullen Receptive Language and Visual Reception subscales additionally show significant ($\text{FDR } q < 0.05$) age*subtype interactions, indicative of different developmental trajectories between the subtypes. The image of a child shown in panel A is taken from a commercially available video (Yoga Kids 3; Gaiam, Boulder, Colorado, <http://www.gaiam.com>, created by Marsha Wenig, <http://yogakids.com>) and re-produced here with permission.

© 2003 Gaiam Americas, Inc. All Rights Reserved. **Figure 1A** is taken from a commercially available video (Yoga Kids 3; Gaiam, Boulder, Colorado, <http://www.gaiam.com>, created by Marsha Wenig, <http://yogakids.com>) and re-produced here with permission.

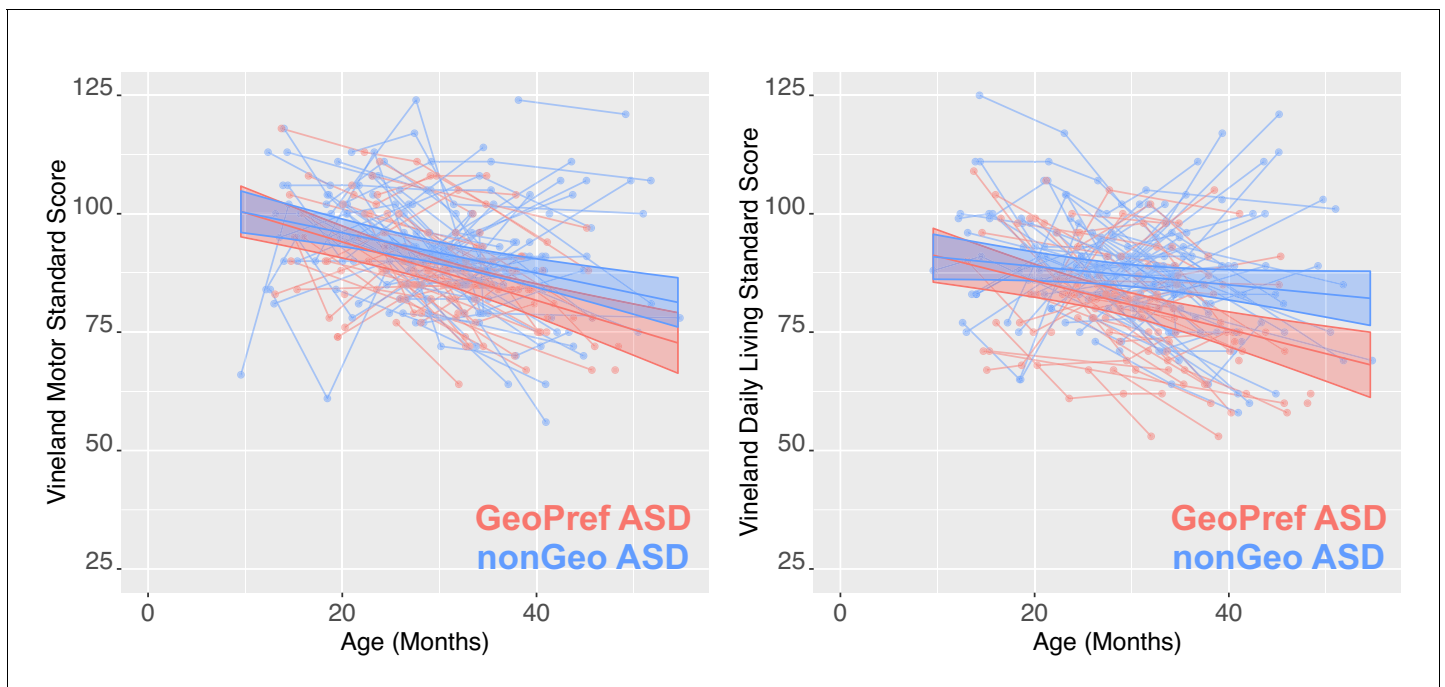


Figure 1—figure supplement 1. Developmental trajectories across Vineland Daily Living Skills and Motor subscales. GeoPref ASD subtype (pink) and nonGeo ASD toddlers (blue).

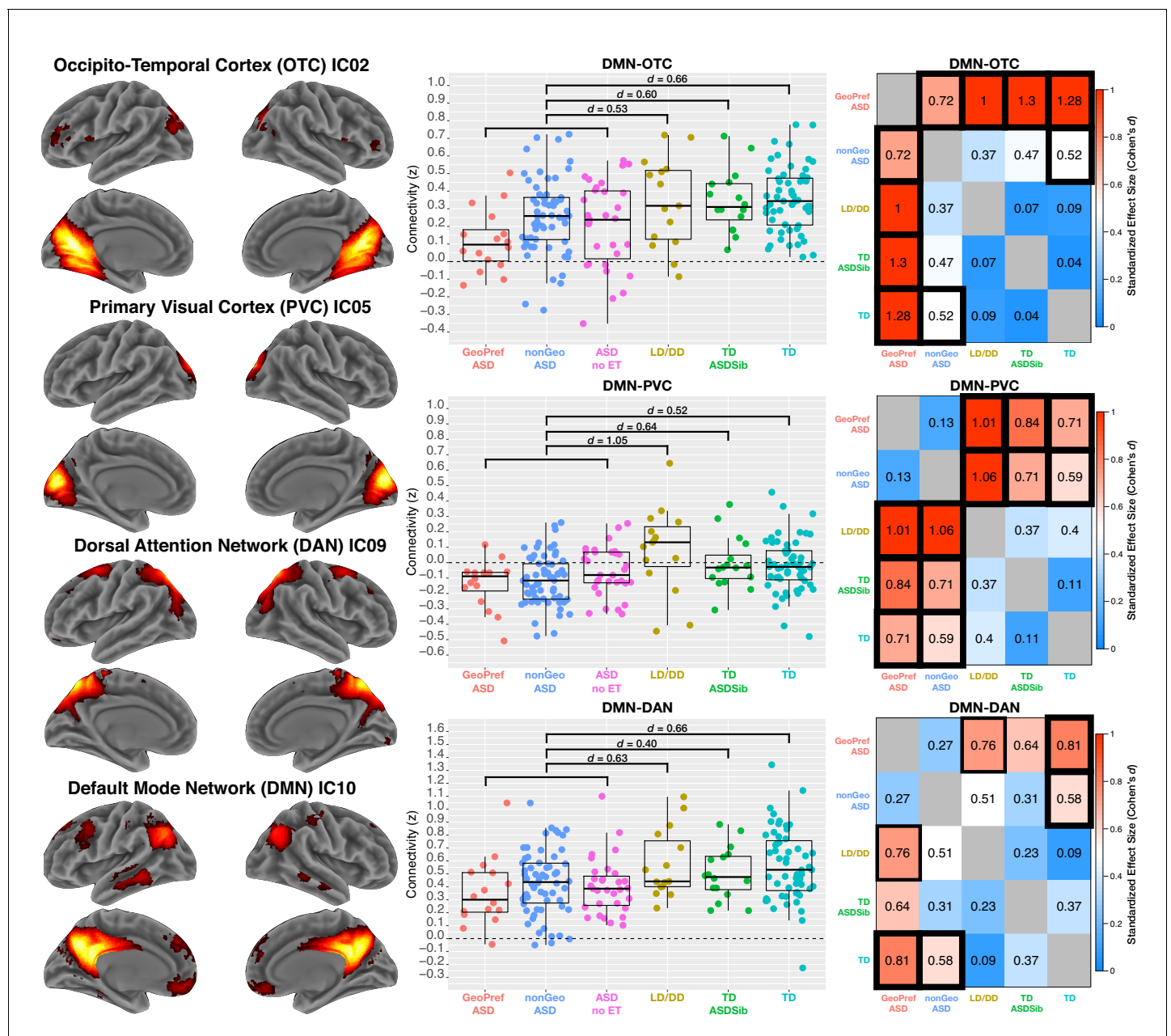


Figure 2. Functional hypoconnectivity between DMN, visual and attention networks in ASD. The left column shows surface renderings of ICA components of visual association areas in occipito-temporal cortex (OTC; IC02), primary visual cortex (PVC; IC05), the dorsal attention network (DAN; IC09) and the default mode network (DMN; IC10). The middle column shows scatter-boxplots for DMN-OTC, DMN-PVC, and DMN-DAN connectivity across GeoPref ASD (pink), nonGeo ASD (blue), ASD with no eye tracking data (ASD no ET; magenta), LD/DD (yellow), TD ASDSib (green), and TD (turquoise). Standardized effect sizes (Cohen's d) are reported in the plots for comparisons of all ASD individuals combined, compared to the other non-ASD comparison groups. The middle line of the boxplot represents the median. The box boundaries represent the interquartile range (IQR; Q1 = 25th percentile, Q3 = 75th percentile), while the whiskers indicate the a distance of 1.5*IQR. The right column uses heatmaps to show standardized effect sizes (Cohen's d) for all pairwise comparisons of groups with rsfMRI and eye tracking data used in the subtype model. Note that effect sizes are depicted as absolute values, and the directionality of the effects can be seen in the scatter-boxplots. Cells outlined in thick black lines are specific comparisons that survive FDR $q < 0.05$. Cells outlined in thinner black lines are comparisons that survive FDR $q < 0.1$.

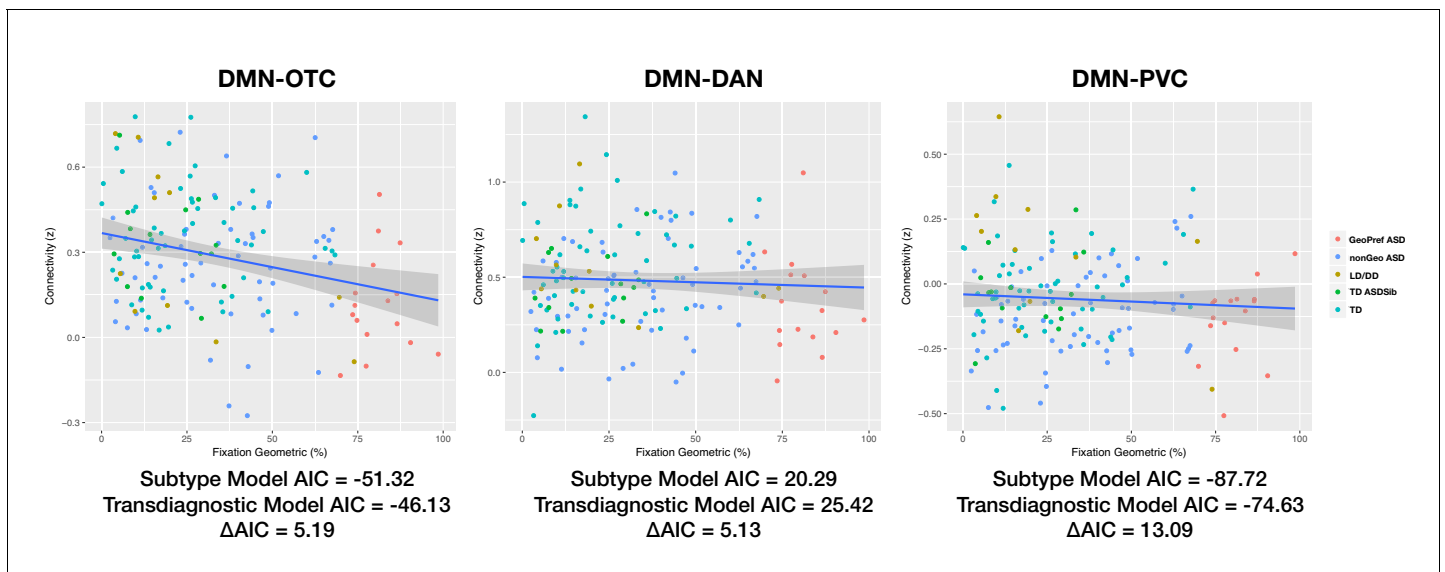


Figure 2—figure supplement 1. Scatterplots of the relationship between functional connectivity by percentage fixation on the geometric stimulus. This figure shows scatterplots of functional connectivity and percentage fixation on the geometric stimulus. Below each scatterplot are the AIC values for the subtype and transdiagnostic models.

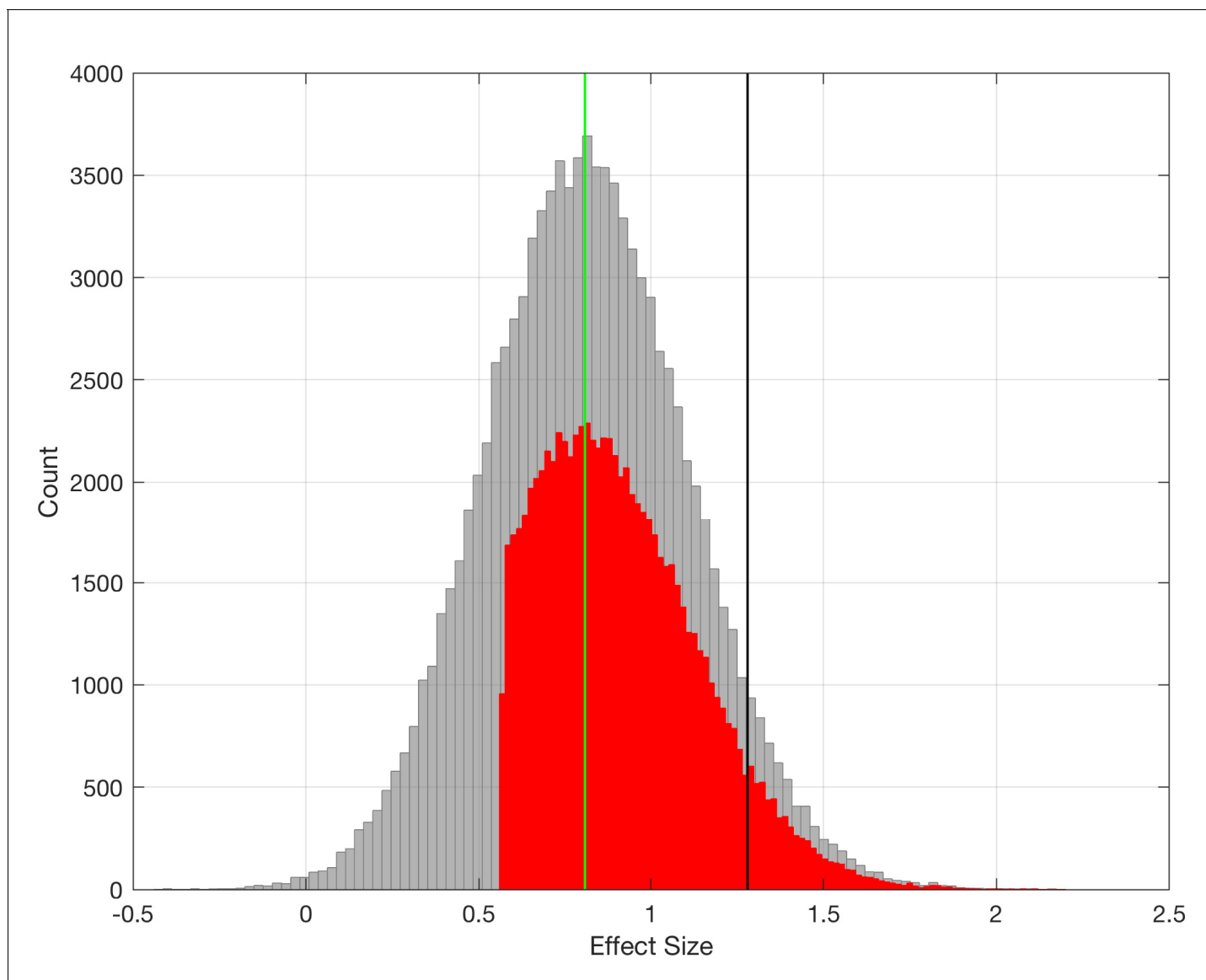


Figure 2—figure supplement 2. Simulation illustrating statistical power. Power simulation at minimum effect size ($d = 0.80751$) to achieve 80% power at $\alpha = 0.05$ and $n = 16$ (GeoPref ASD) vs $n = 55$ (TD). The gray histogram plotted here are the sample effect size estimates simulated from 100,000 experiments sampling $n = 16$ vs $n = 55$ from a population size of $n = 10,000,000$, and where the true population effect size is $d = 0.80751$ (green vertical line). Plotted in red is the histogram of sample effect sizes from 80,000 experiments whereby the results of the simulated experiment resulted in a rejected null hypothesis (e.g., $p < 0.05$). Plotted as a black vertical line is the actual sample effect size estimated from the current study for GeoPref ASD vs TD ($d = 1.28$).

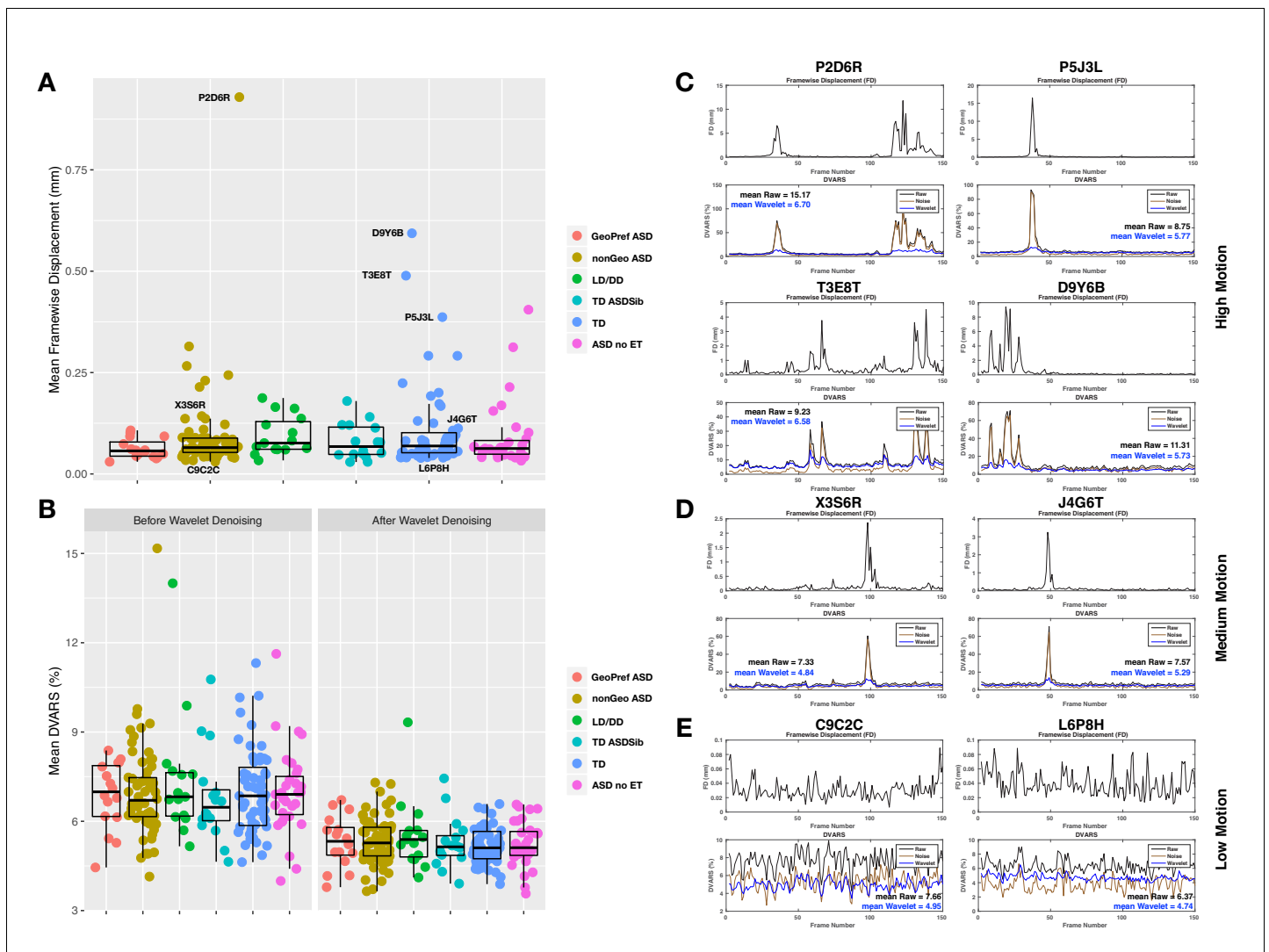


Figure 2—figure supplement 3. Head motion effects. Panels A-B show mean framewise displacement (A) and mean DVARS before and after wavelet denoising (B) across all groups. Specific example subjects are labeled in panel A and shown in panels C-E as examples of high (C), medium (D), or low motion (E) subjects. The plots in panels C-E show framewise displacement on top and DVARS on the bottom. The DVARS plot shows the DVARS trace from the raw preprocessed data (black), the noise identified from wavelet denoising (brown), and the final wavelet denoised dataset (blue).

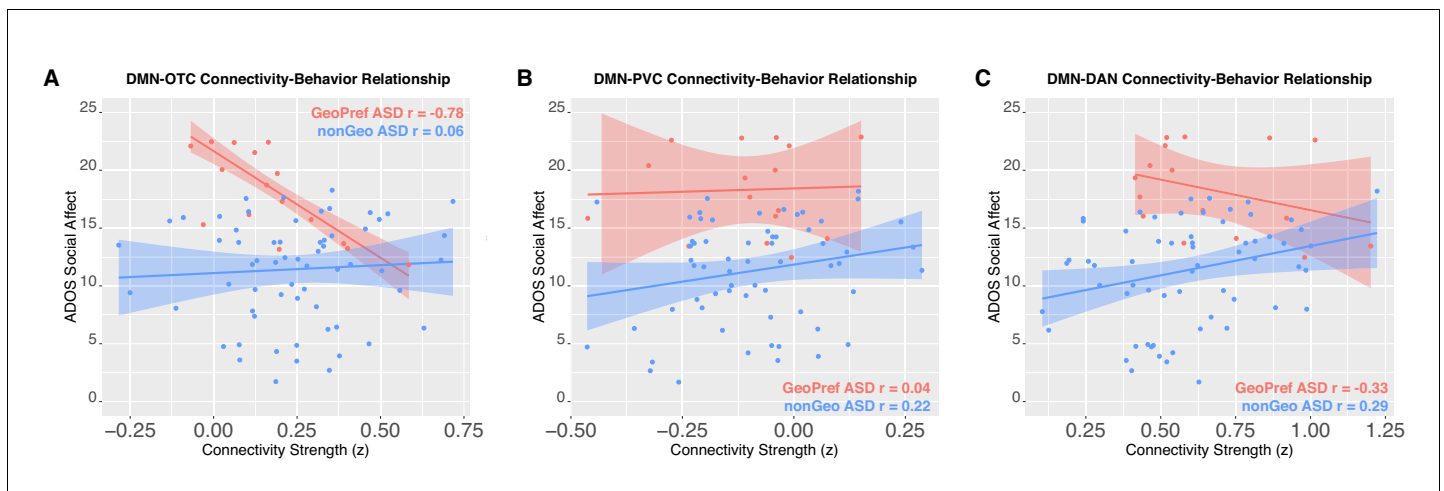


Figure 3. Connectivity-social-communication relationships. This figure shows functional connectivity-social-communication relationships for DMN-OTC (Panel A), DMN-PVC (Panel B), and DMN-DAN (Panel C). The relationship for GeoPref ASD is shown in pink, while nonGeo ASD is shown in blue. Both ADOS social affect and connectivity scores shown in the plot are covariate adjusted scores (taking into account age) from the robust regression model evaluating the relationship.