## Online supplement 1 Dataset details

The ABIDE dataset is a large-scale open-access neuroimaging dataset for ASD, which currently includes resting-state fMRI data from 1495 individuals collected at 17 data acquisition centers. It contains a wealth of demographic, behavioral, and imaging data from ASD patients, providing valuable resources for the study of this highly heterogeneous disorder, and is being widely used in ASD-related studies. All the data analyzed in this study were sourced from the ABIDE dataset. We aimed to identify subtle changes in brain FC in ASD populations using a large dataset to achieve greater statistical power. The dataset includes 659 datasets from patients with ASD and 836 datasets from TD individuals. Each dataset includes one or more resting-state fMRI scan of the individual, a volumetric MPRAGE image, and multiple autism-related behavioral questionnaire scores (such as those on the Social Responsiveness Scale developed by (Constantino et al., 2003), which measures social function, and the Vineland Adaptive Behavior Scales developed by (Sparrow & Cicchetti, 1989), which measures daily function). More information about the specific behavioral measures used can be found on the ABIDE website ([ABIDE (nitrc.org)](https://fcon_1000.projects.nitrc.org/indi/abide/)). All data were completely anonymous and analyzed according to procedures approved by the Institutional Review Board at the University of Utah. All images were obtained with informed consent according to procedures established by the human subjects research committees at each participating institution. MPRAGE image data were not used in this study. To eliminate confounding effects of irrelevant variables and to address the consistent asymmetry due to handedness and lack of available data to estimate normative data in ASD, we excluded left-handed participants and those with poor scan quality. After exclusion, the sample size was 642 for the TD group and 576 for the ASD group.

Data points from age groups with fewer than five TD group participants were excluded from further analysis, as the standard deviation in these age groups was essentially zero (and therefore, W-scores could not be calculated. W-scores represent the extent to which an individual's FC values of different brain functional networks deviate from normative values. And it will be further introduced in the following text.). Hence, we excluded individuals without resting-state fMRI data and those over 40 years of age and under 5 years of age when calculating the W-scores. Moreover, we further eliminated participants aged between 30 and 40 years in the subsequent age-group classification when observing the outlier rate and correlation.