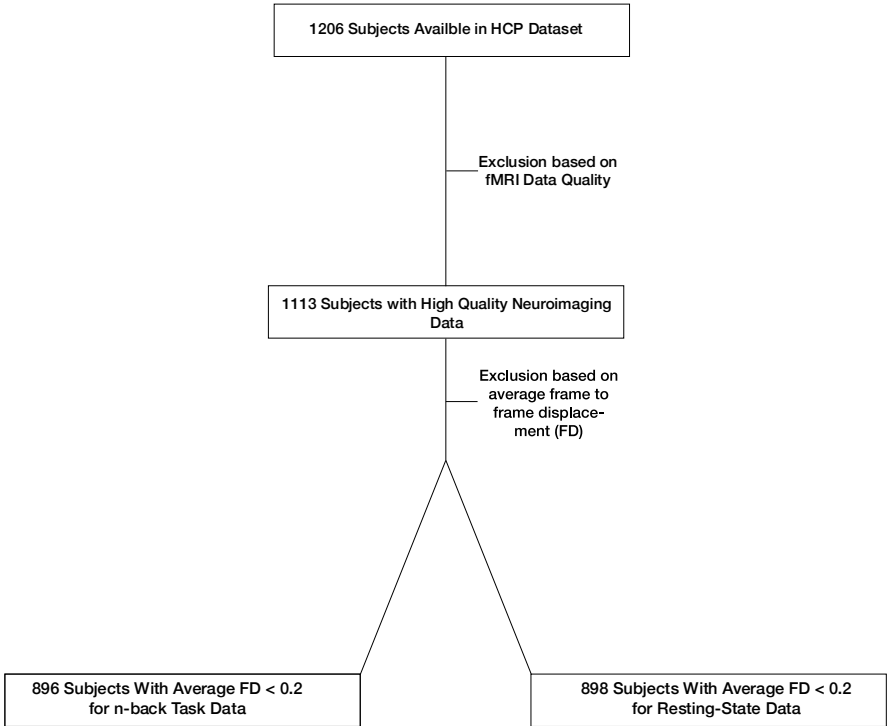
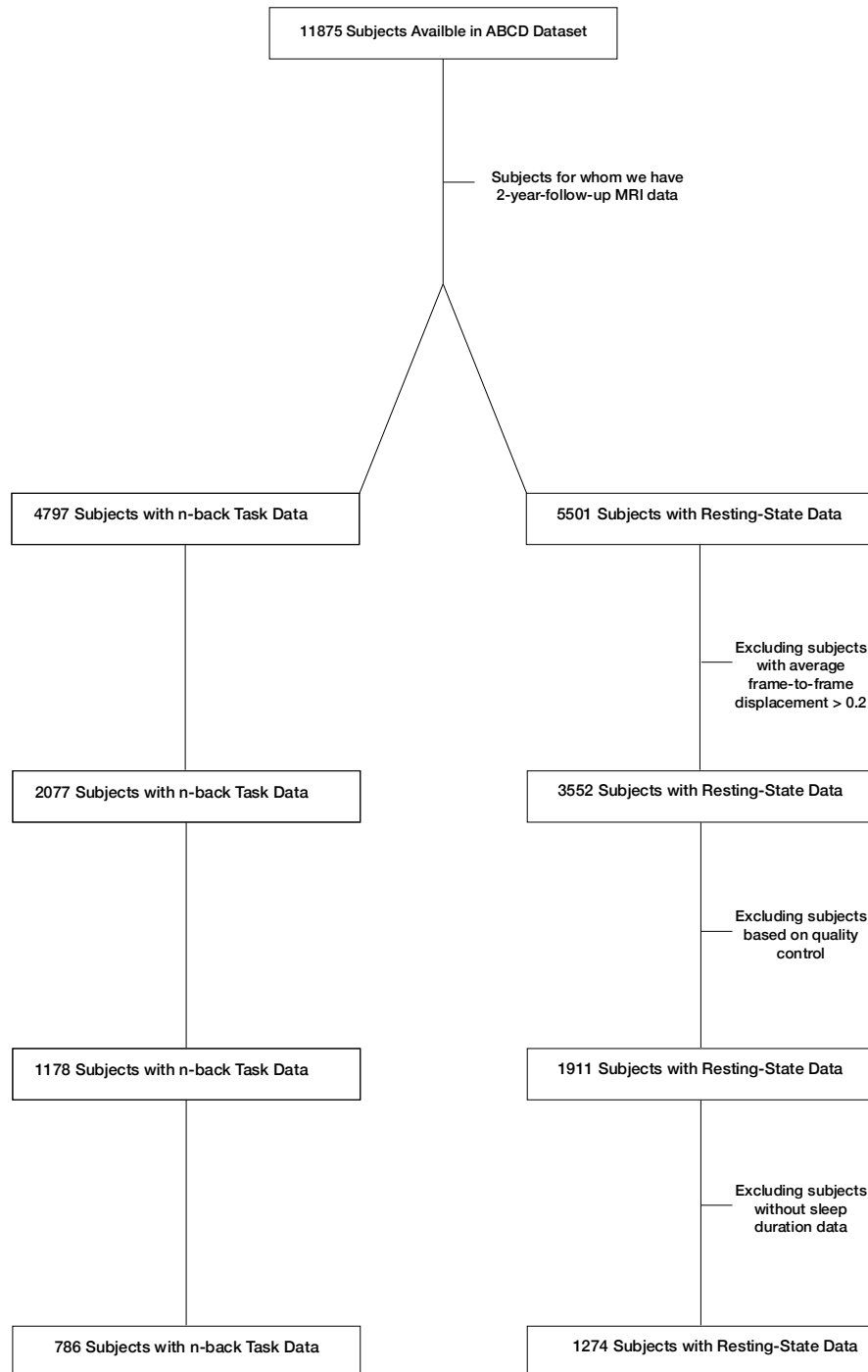


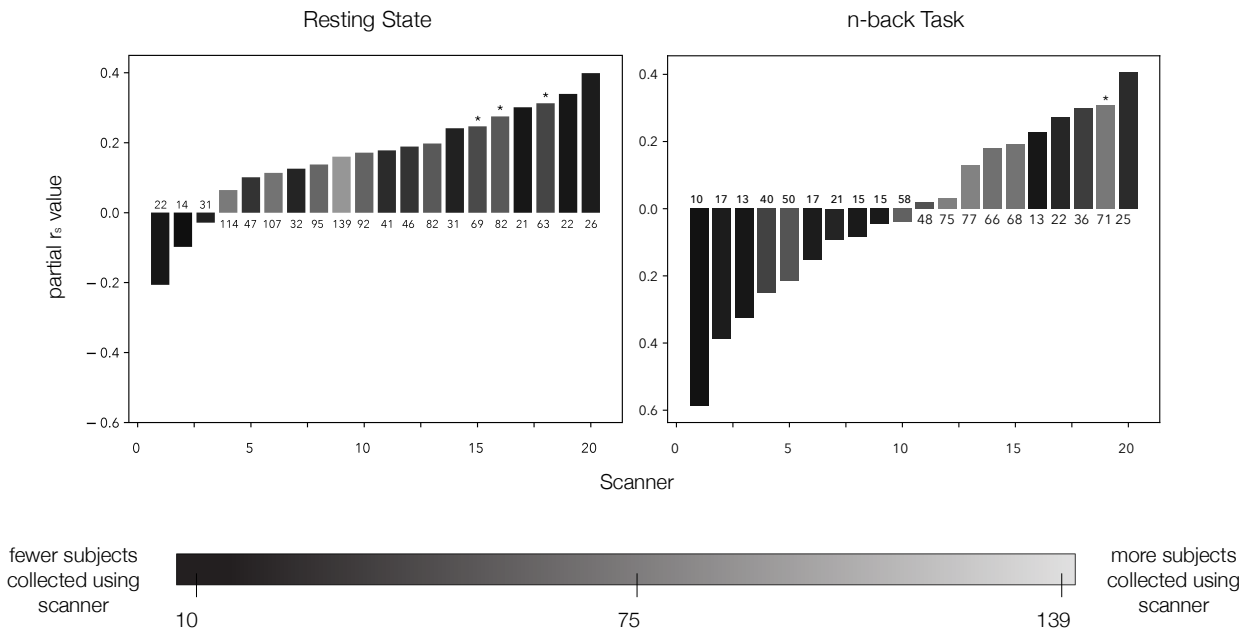
Supplementary material



Supplementary Figure 1. CONSORT diagram outlining exclusion criterion and final participant numbers in the HCP dataset.



Supplementary Figure 2. CONSORT diagram outlining exclusion criterion and final participant numbers in the ABCD Study dataset.



Supplementary Figure 3. Across-dataset Spearman partial correlations between observed reported minutes slept and predicted minutes slept for ABCD Study participants from each scanner separately, controlling for frame-to-frame head displacement, age, sex, and number of runs per participant. Each bar corresponds to a single scanner, with height corresponding to r_s magnitude and hue corresponding to number of participants included. Hue was calculated along a fixed greyscale from 0-1 (0 as black, 1 as white) by dividing the number of participants scanned on a scanner by the total number of participants, and then multiplying by ten to differentiate hues more easily.

		Training Dataset			
		HCP <i>n</i> -back Task	HCP Rest	ABCD <i>n</i> -back Task	ABCD Rest
Tested Dataset	HCP <i>n</i> -back Task	partial $r_s = 0.133$ $p < 0.001$ MATCHED WITH REST: partial $r_s = 0.131$ $p = 0.330$		partial $r_s = 0.054$ $p = 0.045$ CORRELATE WITH <i>n</i> -BACK TASK ACCURACY: partial $r_s = -0.007$ $p = 0.562$	
	HCP Rest		partial $r_s = 0.164$ $p < 0.001$ MATCHED WITH TASK: partial $r_s = 0.139$ $p = 0.447$		partial $r_s = 0.173$ $p < 0.001$ CORRELATE WITH <i>n</i> -BACK TASK ACCURACY: partial $r_s = 0.064$ $p = 0.024$
	ABCD <i>n</i> -back Task	partial $r_s = 0.097$ $p = 0.003$ CORRELATE WITH <i>n</i> -BACK TASK ACCURACY: partial $r_s = 0.090$ $p = 0.001$		partial $r_s = 0.143$ $p < 0.001$ MATCHED WITH REST: partial $r_s = 0.143$ $p = 0.002$	
	ABCD Rest		partial $r_s = 0.215$ $p < 0.001$ CORRELATE WITH <i>n</i> -BACK TASK ACCURACY: partial $r_s = 0.154$ $p < 0.001$		partial $r_s = 0.238$ $p < 0.001$ MATCHED WITH TASK: partial $r_s = 0.223$ $p < 0.001$

Supplementary Table 1. An overview of the training and testing data used for each connectome-based predictive model built. Matched results refer to comparisons with either resting-state or *n*-back task data when training and testing data were quantity-matched in both duration and number of participants. For these models only, *p*-values refer to comparisons between task- and rest-based predictions rather than the significance of the partial r_s -values themselves. Correlations with cognition refer to partial r_s correlations performed between sleep durations predicted by models and observed *n*-back task accuracy values in the tested dataset.

Model	$ r $ -value threshold applied at the CPM feature selection step				
	0.05	0.08	0.10	0.12	0.15
Within Dataset: HCP Task	$r_s = 0.15, p < 0.001$	$r_s = 0.16, p < 0.001$	$r_s = 0.133, p < 0.001$	$r_s = 0.09, p = 0.01$	N/A
Within Dataset: HCP Rest	$r_s = 0.17, p < 0.001$	$r_s = 0.17, p < 0.001$	$r_s = 0.164, p < 0.001$	$r_s = 0.16, p < 0.001$	$r_s = 0.18, p < 0.001$
Within Dataset: ABCD Task	$r_s = 0.16, p < 0.001$	$r_s = 0.15, p < 0.001$	$r_s = 0.143, p < 0.001$	$r_s = 0.13, p < 0.001$	$r_s = 0.08, p = 0.03$
Within Dataset: ABCD Rest	$r_s = 0.25, p < 0.001$	$r_s = 0.25, p < 0.001$	$r_s = 0.238, p < 0.001$	$r_s = 0.23, p < 0.001$	$r_s = 0.22, p < 0.001$

Supplementary Table 2. Within-dataset prediction results from models defined with different feature-selection thresholds. Models built using an $|r|$ threshold of 0.10 are reported in the main text. For the model trained and tested on HCP task data with a threshold of 0.15, no features were selected in some model iterations.