Supplementary Table 1. Details of the included datasets for pretraining (HCP-D, HCP-YA and HCP-A) and instruction tuning (ADHD-200, ABIDE-I and ADNI).

Dataset	Sample No.	Age Mean	Age Range	Female No.	Disorder No.
HCP-D	473	14.7	[6, 22]	247	-
HCP-YA	1,113	28.8	[22, 37]	606	-
HCP-A	624	59.1	[36, 86]	359	-
ADHD-200	766	12.0	[7, 22]	288	279
ABIDE-I	819	17.3	[6, 56]	111	327
ADNI	683	74.5	[56, 96]	364	317

Supplementary Table 2. Illustrations of knowledge-injecting prompt for all the cognitive measures and functions

Cognitive measure	Poor	Normal
Flanker	The Flanker test scores [...], below the normal limit. The Flanker test result shows poor performance of attention function, indicating a risk of inattention and disinhibition.	The Flanker test scores [...], above the normal limit. The Flanker test result shows normal performance of attention function.
Dimensional change card sort	The Dimensional Change Card Sort test scores [...], below the normal limit. The Dimensional Change Card Sort test result shows poor performance of shifting function, indicating a risk of cognitive inflexibility.	The Dimensional Change Card Sort test scores [...], above the normal limit. The Dimensional Change Card Sort test result shows normal performance of shifting function.
List sorting	The List Sorting test scores [...], below the normal limit. The List Sorting test result shows poor performance of working memory function, indicating a risk of impaired working memory.	The List Sorting test scores [...], above the normal limit. The List Sorting test result shows normal performance of working memory function.
Pattern comparison	The Pattern Comparison test scores [...], below the normal limit. The Pattern Comparison test result shows poor performance of processing speed function, indicating a risk of slow processing speed.	The Pattern Comparison test scores [...], above the normal limit. The Pattern Comparison test result shows normal performance of processing speed function.
Picture vocabulary	The Picture Vocabulary test scores [...], below the normal limit. The Picture Vocabulary test result shows poor	The Picture Vocabulary test scores [...], above the normal limit. The Picture Vocabulary test result shows

	performance of vocabulary comprehension function, indicating a risk of delayed language skill in general vocabulary knowledge.	normal performance of vocabulary comprehension function.
Oral reading	The Oral Reading test scores [...], below the normal limit. The Oral Reading test result shows poor performance of reading coding function, indicating a risk of delayed language skill in reading coding.	The Oral Reading test scores [...], above the normal limit. The Oral Reading test result shows normal performance of reading coding function.
Picture sequence	The Picture Sequence test scores [...], below the normal limit. The Picture Sequence test result shows poor performance of episodic memory function, indicating a risk of episodic memory loss and impairment.	The Picture Sequence test scores [...], above the normal limit. The Picture Sequence test result shows normal performance of episodic memory function.

Supplementary Table 3. Illustrations of knowledge-reactivating instruction for ADHD, ASD and MCI

BD	Instruction
ADHD	Attention Deficit Hyperactivity Disorder has typical symptoms of hyperactivity, inattention, disinhibition, impaired working memory, impulsivity. Will this participant be diagnosed with Attention Deficit Hyperactivity Disorder?
ASD	Autism Spectrum Disorder has typical symptoms of deficits in social interaction, inattention, repetitive behavior or restricted interests, delayed language skill. Will this participant be diagnosed with Autism Spectrum Disorder?
MCI	Mild Cognitive Impairment has typical symptoms of memory loss, inattention, cognitive inflexibility, slow processing speed, delayed language skill. Will this participant be diagnosed with Mild Cognitive Impairment?