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Supplementary Materials

2 **Supplementary Table 1.** Demographic and clinical characteristics of the samples across 23
3 sites

Site	MDD patients											Healthy controls			
	Number	Age	Sex	Education	Onset age	Illness	First-episode	Episode	Medication	HAMD	HAMA	Number	Age	Sex	Education
		(years)	(M/F)	(years)	(years)	duration	(yes/no/NA)	number	(yes/no/NA)				(years)	(M/F)	(years)
						(months)									
1	282	38.7±13.7	99/183	12.0±3.6	35.8±13.5	50.0±66.1	209/49/24	1.2±0.4	124/125/33	20.9±5.6	22.6±9.1	251	39.6±15.9	87/164	13.0±3.9
		(12-77)		(0-18)	(11-75)	(1-360)		(1-3)		(0-35)	(0-47)		(19-64)		(1-20)
2	134	18.9±3.9	35/99	12.0±2.6	16.1±4.1	17.2±19.7	127/6/1	1.1±0.4	14/67/53	17.9±9.2	17.3±6.4	62	20.8±3.1	23/39	13.8±1.8
		(12-30)		(6-17)	(8-28)	(0-120)		(1-4)		(0-52)	(8-34)		(12-32)		(9-16)
3	20	34.4±10.6	5/15	14.9±3.0	35.6±12.0	14.5±29.1	18/2/0	1.2±0.5	0/20/0	29.4±6.4	20.7±9.1	20	26.5±11.2	5/15	15.4±1.5
		(20-60)		(9-18)	(23-59)	(1-96)		(1-3)		(18-44)	(6-38)		(19-58)		(12-18)
4	33	30.7±10.5	15/18	12.3±4.2	27.4±11.3	40.7±57.2	17/14/2	2.4±3.6	12/20/1	21.7±5.6	-	29	29.8±9.5	9/20	13.0±3.8
		(15-51)		(1-19)	(13-50)	(2-216)		(1-20)		(0-32)			(18-49)		(6-20)
5	115	33.7±10.0	51/64	12.9±3.5	-	-	115/0/0	1	0/0/115	26.7±3.8	15.0±4.4	55	37.0±8.8	32/23	14.4±2.7
		(18-53)		(6-18)						(19-39)	(8-28)		(20-61)		(9-18)
6	60	31.3±9.4	32/28	12.1±3.0	28.4±9.7	44.2±60.3	21/34/5	1.9±1.1	53/7/0	20.3±6.6	16.0±9.2	98	23.8±5.2	45/53	13.9±2.3
		(17-51)		(6-19)	(13-48)	(0-360)		(1-6)		(6-40)	(3-41)		(18-42)		(9-19)
7	20	19.9±6.8	4/16	10.7±3.0	18.8±7.4	14.3±15.9	18/2/0	1.1±0.3	15/5/0	22.8±12.2	10.5±8.4	29	20.0±3.8	8/21	12.0±2.5
		(11-33)		(5-16)	(10-33)	(1-48)		(1-2)		(4-50)	(0-36)		(13-28)		(7-16)
8	45	32.8±9.2	16/29	15.7±1.9	30.6±9.0	21.4±11.4	43/2/0	3.6±2.3	2/43/0	23.9±3.9	18.5±4.2	40	31.5±9.7	17/23	15.4±1.9
		(18-55)		(9-22)	(16-51)	(3-57)		(1-10)		(17-32)	(13-27)		(18-56)		(9-18)
9	45	45.4±13.9	18/27	10.8±4.6	42.4±13.7	36.7±54.2	31/14/0	1.4±0.8	45/0/0	-	-	25	37.3±13.8	10/15	13.4±4.0
		(15-66)		(0-21)	(14-63)	(1-240)		(1-4)					(19-64)		(5-19)
10	83	35.0±12.3	38/45	13.2±3.0	27.0±11.2	93.9±96.4	31/35/17	2.4±1.9	61/15/7	14.5±8.1	14.5±8.7	70	36.1±12.6	31/39	14.6±2.3
		(18-65)		(6-16)	(6-58)	(1-480)		(0-10)		(0-35)	(0-40)		(19-60)		(9-16)
11	111	38.3±13.0	55/56	10.9±3.5	32.1±12.6	76.0±93.7	31/77/3	3.4±3.6	108/0/3	23.7±9.2	-	67	36.9±12.0	30/37	12.9±3.6
		(16-59)		(4-19)	(11-58)	(1-432)		(1-30)		(1-49)			(20-59)		(3-18)

12	62	30.5±7.2 (18-45)	21/41	13.7±3.4 (9-21)	29.6±7.1 (18-44)	6.1±4.2 (1-12)	62/0/0	1	0/62/0	21.3±3.5 (15-32)	-	32	29.6±5.0 (21-44)	15/17	14.6±2.8 (9-19)
13	30	40.3±13.8 (18-60)	13/17	12.1±4.0 (0-18)	34.3±13.6 (16-60)	-	6/24/0	1.5±1.1 (0-4)	0/0/30	17.9±9.3 (0-35)	11.4±5.7 (3-26)	28	35.9±13.8 (22-59)	9/19	11.1±4.3 (0-16)
14	139	43.8±11.4 (18-64)	48/91	9.0±3.6 (0-16)	37.8±11.6 (12-62)	67.5±76.9 (0-339)	42/97/0	2.5±2.1 (1-21)	139/0/0	29.9±10.5 (2-58)	-	147	38.3±12.0 (18-60)	68/79	13.2±4.2 (4-21)
15	31	22.1±4.8 (16-33)	6/25	11.9±2.5 (8-19)	21.9±5.3 (8-33)	13.0±15.6 (1-72)	24/7/0	2.5±2.8 (1-8)	0/31/0	-	-	35	21.5±4.6 (17-35)	23/12	12.6±1.4 (12-16)
16	81	25.9±7.6 (17-51)	35/46	13.9±2.6 (8-19)	23.0±8.2 (8-49)	28.0±42.4 (1-180)	44/37/0	1.8±1.1 (1-6)	1/80/0	25.4±3.8 (20-38)	13.7±7.6 (4-40)	81	25.7±7.4 (18-52)	44/37	15.5±2.8 (7-22)
17	44	35.2±9.5 (20-56)	17/27	12.6±4.1 (3-20)	34.9±9.6 (20-56)	3.8±2.6 (1-11)	44/0/0	1	0/44/0	23.6±5.2 (18-38)	22.1±5.9 (11-41)	49	34.7±9.7 (19-54)	19/30	14.3±4.2 (5-20)
18	33	35.3±12.8 (18-60)	17/16	12.6±4.7 (0-16)	-	19.4±21.8 (0-67)	19/14/0	1.7±0.9 (1-4)	0/33/0	22.4±4.5 (18-34)	-	32	32.9±12.0 (18-57)	12/20	12.3±3.2 (6-16)
19	32	27.0±11.0 (17-52)	5/27	12.7±3.2 (6-17)	25.6±10.9 (16-51)	12.9±14.4 (1-48)	23/9/0	1.3±0.5 (1-2)	17/15/0	23.1±5.7 (11-34)	21.4±6.7 (9-36)	32	30.9±7.3 (21-46)	16/16	13.9±2.8 (9-19)
20	20	27.8±9.0 (15-51)	4/16	13.6±4.4 (7-26)	26.7±9.2 (15-51)	14.6±15.1 (1-54)	14/6/0	1.3±0.5 (1-2)	2/18/0	24.9±6.5 (11-36)	-	20	31.4±11.0 (23-59)	5/15	16.1±3.2 (9-20)
21	62	32.5±11.3 (16-61)	17/45	12.3±4.1 (0-22)	31.4±11.7 (11-59)	35.8±44.9 (1-240)	20/17/25	-	0/1/61	22.9±2.6 (18-27)	17.4±6.5 (9-31)	56	32.8±11.1 (19-61)	31/25	15.9±4.6 (5-25)
22	34	35.8±10.2 (19-53)	9/25	13.1±3.7 (0-18)	31.2±7.9 (19-45)	5.6±14.9 (1-72)	19/15/0	1.1±1.4 (0-4)	15/19/0	22.4±6.1 (14-36)	21.4±7.6 (6-38)	25	35.0±13.4 (18-67)	8/17	14.1±2.8 (6-18)
23	55	13.8±1.5 (11-17)	7/48	7.8±1.5 (5-11)	-	-	0/0/55	-	55/0/0	-	-	26	13.7±2.2 (9-17)	13/13	7.7±2.2 (3-11)

- 1 Data are expressed as mean ± standard deviation. Numbers in parentheses are the range.
- 2 Abbreviations: MDD, major depressive disorder; M, male; F, female; NA, not available;
- 3 HAMD, Hamilton Rating Scale for Depression; HAMA, Hamilton Rating Scale for Anxiety.
- 4 Education is missing for 5 patients and 5 controls.
- 5 Onset age is missing for 350 patients.
- 6 Illness duration is missing for 337 patients.

- 1 First-episode information is missing for 132 patients.
- 2 Episode number is missing for 211 patients.
- 3 Medication information is missing for 303 patients.
- 4 HAMD is missing for 242 patients.
- 5 HAMA is missing for 769 patients.
- 6

1 **Supplementary Table 2.** Cortical regions with significant group differences in ALFF

Region	Cluster size (voxels)	Peak <i>t</i> value	Peak MNI coordinate
MDD > HC			
Left inferior temporal gyrus	985	4.61	-61.5, -36.5, -22.5
Right inferior temporal gyrus	583	4.33	44.5, -34.5, -24.5
Right middle frontal gyrus	483	4.66	34.5, 11.5, 45.5
Right precentral gyrus			
Right superior frontal gyrus	272	4.43	16.5, 9.5, 57.5
Right middle frontal gyrus	196	4.00	28.5, 29.5, 31.5
MDD < HC			
Bilateral lingual gyrus	1092	-5.39	10.5, -100.5, 1.5
Bilateral calcarine sulcus			
Bilateral precuneus			

2 Abbreviations: ALFF, amplitude of low-frequency fluctuation; MNI, Montreal Neurological
3 Institute; MDD, major depressive disorder; HC, healthy controls.

4

1 **Supplementary Table 3.** Cortical regions with significant group differences in ReHo

Region	Cluster size (voxels)	Peak <i>t</i> value	Peak MNI coordinate
MDD > HC			
Left superior frontal gyrus	466	5.00	-5.5, 27.5, 55.5
Left superior frontal gyrus	376	4.93	-19.5, 13.5, 51.5
Left middle frontal gyrus			
Right inferior temporal gyrus	298	5.67	22.5, -24.5, -26.5
Right parahippocampal gyrus			
Left temporal pole	229	4.37	-19.5, 7.5, -32.5
Left parahippocampal gyrus			
Left inferior temporal gyrus	168	4.11	-63.5, -38.5, -22.5
MDD < HC			
Bilateral calcarine sulcus	1467	-6.04	-21.5, -88.5, -16.5
Left lingual gyrus			
Left cuneus			
Right middle occipital gyrus	1000	-5.00	28.5, -86.5, 21.5
Right middle temporal gyrus			
Right inferior occipital gyrus			
Right superior occipital gyrus			
Right postcentral gyrus	613	-6.93	60.5, -2.5, 23.5
Right precentral gyrus			
Left postcentral	546	-6.18	-57.5, -8.5, 35.5
Right postcentral gyrus	363	-4.86	36.5, -40.5, 61.5
Right precentral gyrus			
Left middle occipital gyrus	311	-5.65	-49.5, -76.5, 3.5

2 Abbreviations: ReHo, regional homogeneity; MNI, Montreal Neurological Institute; MDD,
3 major depressive disorder; HC, healthy controls.

4

1 **Supplementary Table 4.** Cortical regions with significant group differences in DC

Region	Cluster size (voxels)	Peak <i>t</i> value	Peak MNI coordinate
MDD > HC			
Bilateral supplementary motor area	6808	6.35	-7.5, 27.5, 53.5
Bilateral superior frontal gyrus			
Left middle frontal gyrus			
Left inferior frontal gyrus			
Left insula			
Left temporal pole			
Left superior temporal gyrus			
Left middle temporal gyrus			
Left inferior temporal gyrus			
Left parahippocampal gyrus			
Left fusiform gyrus			
Right inferior temporal gyrus	1617	5.95	56.5, -28.5, -14.5
Right middle temporal gyrus			
Right fusiform gyrus			
Right parahippocampal gyrus			
Right inferior frontal gyrus	1203	5.78	42.5, -16.5, 5.5
Right insula			
Right temporal pole			
Right middle frontal gyrus	860	5.31	46.5, 39.5, 21.5
Right inferior parietal lobule	185	4.59	50.5, -48.5, 49.5
MDD < HC			
Bilateral superior occipital gyrus	9293	-6.34	0.5, -84.5, 19.5
Bilateral middle occipital gyrus			
Bilateral inferior occipital gyrus			
Bilateral cuneus			

Bilateral calcarine sulcus			
Bilateral lingual gyrus			
Right postcentral gyrus	1602	-5.98	58.5, -10.5, 47.5
Right precentral gyrus			
Left postcentral gyrus	1161	-5.24	-43.5, -18.5, 55.5
Left precentral gyrus			
Bilateral paracentral lobule	386	-4.79	-3.5, -28.5, 55.5

- 1 Abbreviations: DC, degree centrality; MNI, Montreal Neurological Institute; MDD, major
- 2 depressive disorder; HC, healthy controls.
- 3

1 **Supplementary Table 5.** Cortical regions with significant group differences in GMV

Region	Cluster size (voxels)	Peak <i>t</i> value	Peak MNI coordinate
MDD < HC			
Left medial superior frontal gyrus	424	-5.43	-1.5, 51.5, 11.5
Left insula	387	-5.05	-41.5, 5.5, 3.5
Left Rolandic operculum			
Right insula	191	-5.05	46.5, 1.5, -0.5
Left inferior frontal gyrus	148	-4.62	-57.5, 9.5, 7.5

2 Abbreviations: GMV, gray matter volume; MNI, Montreal Neurological Institute; MDD,
3 major depressive disorder; HC, healthy controls.

4

1 **Supplementary Table 6.** rs-fMRI acquisition parameters across 23 sites

Site	Institution	Scanner	TR (ms)	TE (ms)	FA (°)	Slice number	Time points
1	Faculty of Psychology, Southwest University	Siemens Tim Trio 3T	2000	30	90	32	242
2	Department of Psychiatry, The First Affiliated Hospital of Chongqing Medical University	GE Signa 3T	2000	40	90	33	240
3	National Clinical Research Center for Mental Disorders (Peking University Sixth Hospital) & Key Laboratory of Mental Health, Ministry of Health (Peking University)	Siemens Tim Trio 3T	2000	30	90	30	210
4	Mental Health Center, West China Hospital, Sichuan University	Philips Achieva 3T TX	2000	30	90	38	240
5	First Hospital of Shanxi Medical University	Siemens Tim Trio 3T	2000	30	90	32	212
6	The Institute of Mental Health, Second Xiangya Hospital of Central South University	Philips Gyroscan Achieva 3T	2000	30	90	36	250
7	Affiliated Brain Hospital of Guangzhou Medical University	Philips Achieva X-series 3T	2000	30	90	33	240
8	The First Affiliated Hospital of Xi'an Jiaotong University, Xi'an Central Hospital	GE Excite 1.5T	2500	35	90	36	150
9	Department of Psychosomatics and Psychiatry, Zhongda Hospital, School of Medicine, Southeast University	Siemens Verio 3T	2000	25	90	36	240
10	Beijing Anding Hospital, Capital Medical University	Siemens Tim Trio 3T	2000	30	90	33	240
11	Department of Neurology, Affiliated ZhongDa Hospital of Southeast University	Siemens Verio 3T	2000	25	90	36	240
12	The Second Xiangya Hospital of Central South University	Siemens Tim Trio 3T	2500	25	90	39	200
13	Department of Clinical Psychology, Suzhou Suzhou Psychiatric Hospital, The Affiliated Guangji Hospital of Soochow University	Siemens Skyra 3T	2000	30	90	32	240

14	The First Affiliated Hospital of Anhui Medical University	GE Discovery MR750w 3T	2000	30	90	35	185
15	Xiangya 2nd Hospital, Central South University	Siemens Skyra 3T X	2000	30	90	36	240
16	The First Affiliated Hospital of Jinan University	GE Discovery MR750 3T	2000	25	90	35	200
17	First Affiliated Hospital of Kunming Medical University	Philips Achieva 3T	2200	35	90	50	240
18	Huaxi MR Research Center, West China Hospital of Sichuan University	GE Signa 3T	2000	30	90	30	200
19	The Second Xiangya Hospital of Central South University	Siemens Skyra 3T	2000	30	90	33	240
20	The First Affiliated Hospital, College of Medicine, Zhejiang University	GE Discovery 3T	2000	30	90	43	200
21	Xijing Hospital	GE Discovery MR750 3T	2000	30	90	45	210
22	West China Hospital, Sichuan University	Philips Achieva 3T	2000	30	90	38	240
23	Shenzhen Mental Health Center, Shenzhen Kangning Hospital	GE MR750 3T	2000	30	90	43	240

1 Abbreviations: rs-fMRI, resting-state functional magnetic resonance imaging; TR, repetition
2 time; TE, echo time; FA, flip angle.

3

1 **Supplementary Table 7.** Demographic and clinical characteristics of all participants

Characteristic	MDD patients	Healthy controls	Statistic	<i>P</i> value
Number	1571	1309		
Age (years)	33.1 ± 13.3 (11 - 77)	32.6 ± 13.0 (9 - 67)	<i>t</i> = 1.150	0.250
Sex (M/F)	567/1004	560/749	χ^2 = 13.413	< 0.001
Education (years)	12.0 ± 3.7 (0 - 26)	13.6 ± 3.6 (0 - 25)	<i>t</i> = -11.857	< 0.001
Onset age (years)	30.8 ± 12.6 (6 - 75)	-	-	-
Illness duration (months)	42.4 ± 64.8 (0 - 480)	-	-	-
First-episode (yes/no/NA)	973/466/132			
Episode number	1.71 ± 1.74 (0 - 30)	-	-	-
Medication (yes/no/NA)	663/605/303	-	-	-
HAMD	22.5 ± 8.1 (0 - 58)	-	-	-
HAMA	18.4 ± 8.7 (0 - 47)	-	-	-
FD (mm)	0.112 ± 0.067 (0.021 - 0.757)	0.120 ± 0.066 (0.024 - 0.849)	<i>t</i> = -3.250	0.001

2 Data are expressed as mean ± standard deviation. Numbers in parentheses are the range.
3 Abbreviations: MDD, major depressive disorder; M, male; F, female; NA, not available;
4 HAMD, Hamilton Rating Scale for Depression; HAMA, Hamilton Rating Scale for Anxiety.
5

1 **Supplementary Table 8.** Demographic information of the six adult donors in the AHBA

Donor	Age (years)	Sex	Ethnicity	Hemisphere	Post-mortem interval (h)
H0351.2001	24	Male	African American	Both	23
H0351.2002	39	Male	African American	Both	10
H0351.1009	57	Male	Caucasian	Left	25.5
H0351.1012	31	Male	Caucasian	Left	17.5
H0351.1015	49	Female	Hispanic	Left	30
H0351.1016	55	Male	Caucasian	Left	18

2 Abbreviation: AHBA, Allen Human Brain Atlas.

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