

Electronic supplementary information (ESI)

A ● Control group:

Mon. to Thu. 8:00 a.m. 12:00 p.m. 4:00 p.m.			Fri. to Sat. 8:00 a.m. 12:00 p.m. 4:00 p.m.		Sun. 8:00 a.m. 12:00 p.m. 4:00 p.m.	
water	water	water	water	Water Withdrawal		water

● Model group and NR group:

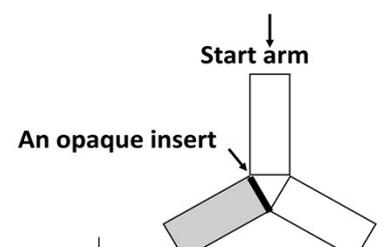
Mon. to Thu. 8:00 a.m. 12:00 p.m. 4:00 p.m.			Fri. to Sat. 8:00 a.m. 12:00 p.m. 4:00 p.m.		Sun. 8:00 a.m. 12:00 p.m. 16:00 p.m.	
water	water	15% (v/v) Alcohol	15% (v/v) Alcohol	Water & Alcohol Withdrawal		water

B

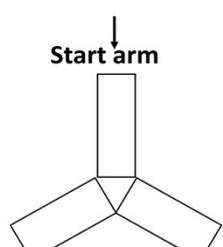
Exchange the positions of two bottles

Time	24h		24h		24h	0.5h ↑ 1h	6h ↑ 12h
Food	Adequate food		Adequate food		Food deprivation	Adequate food	Adequate food
Liquid	Sucrose solution 1% (w/v)	Sucrose solution 1% (w/v)	Sucrose solution 1% (w/v)	Tap water	Liquid deprivation	Sucrose solution 1% (w/v)	Tap water
						↑ Weigh the bottles	↑ Weigh the bottles

C

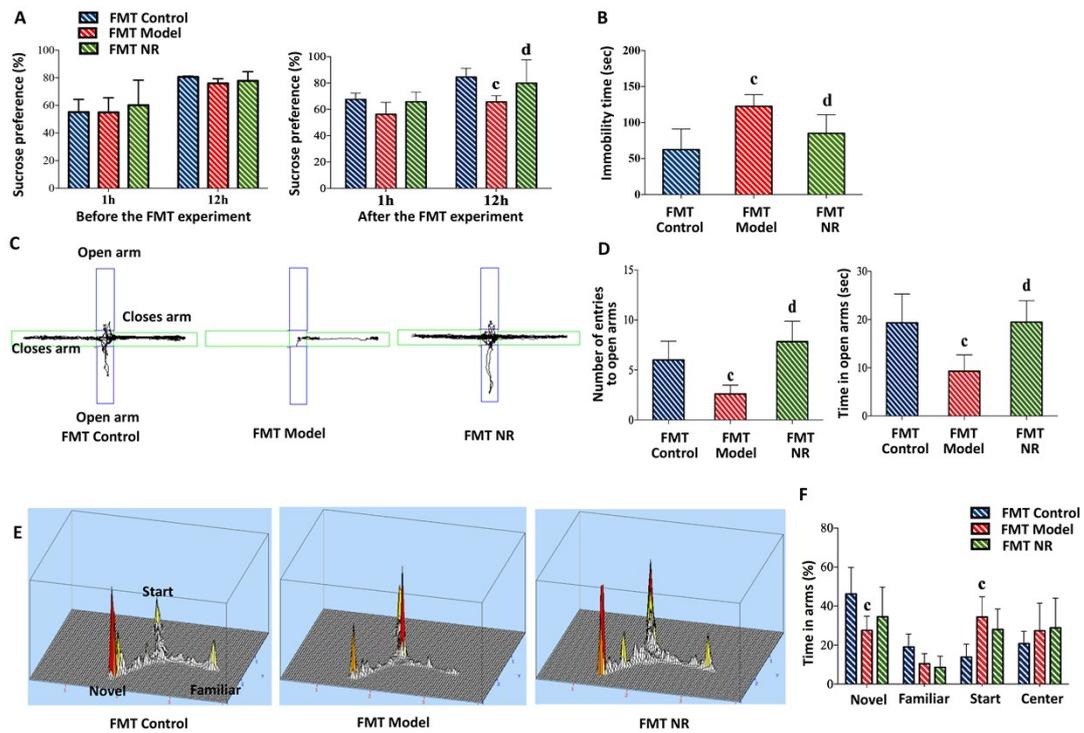


An opaque insert

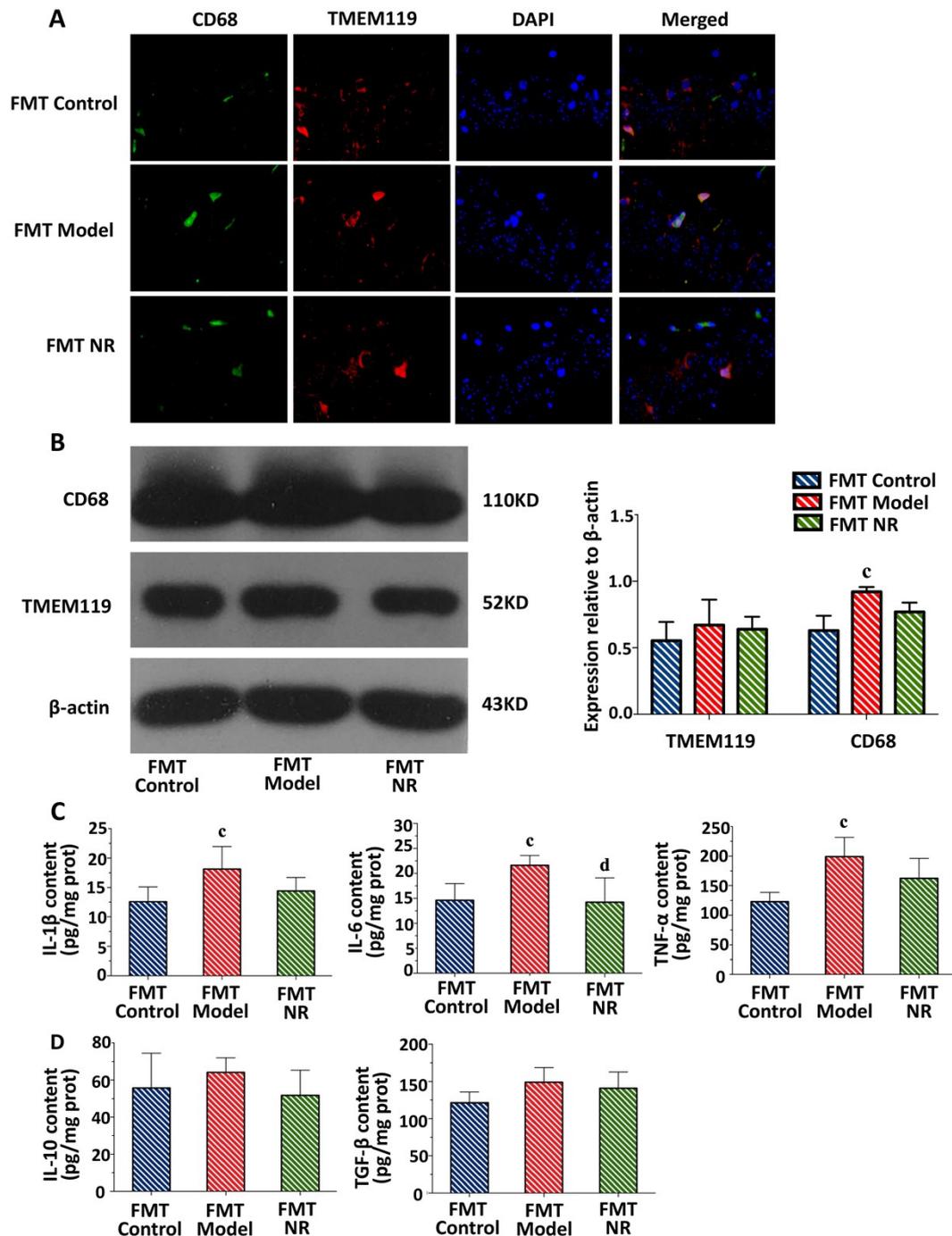


	Novel arm	Familiar arm		Novel arm	Familiar arm
Stage	The first trial		The interval	The second trial	
Time	5 min		2 min	5 min	
scope of activities	Start arm, familiar arm and the center		None	Start arm, familiar arm, novel arm and the center	
Tracking record	No		No	Yes	

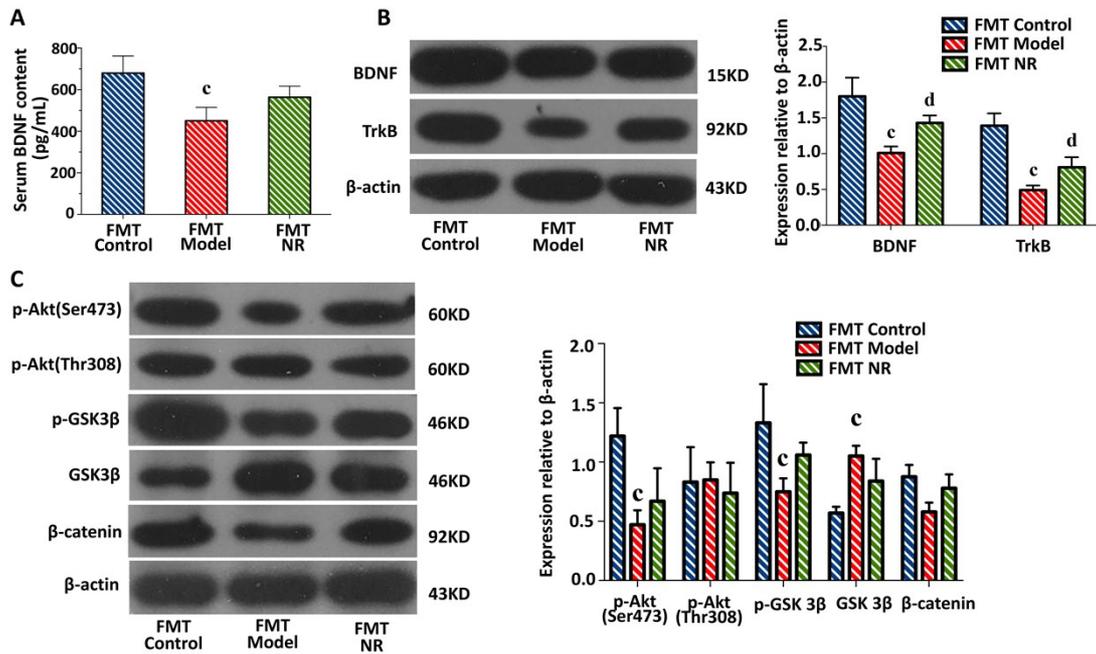
Supplementary Fig. 1 Schematic diagrams of the experiments. (A) Schematic of alcohol exposure and NR intervention. (B) Schematic of the sucrose preference test. (C) Schematic of the Y-maze.



Supplementary Fig. 2 Cognitive and behavioural performance of the recipient mice. (A) Sucrose preference of the mice before the FMT experiment (left); sucrose preference of recipient mice after the FMT experiment (right). (B) Immobility time of recipient mice in the forced swim test. (C) Representative animal track in the elevated plus maze. (D) Number of entries into the open arms of the elevated plus maze by the recipient mice (left); time spent in the open arms of the elevated plus maze by the recipient mice (right). (E) The representative activity heat maps in the Y-maze task for recipient mice. (F) Time spent in the arms of the Y-maze task. Results are displayed as mean \pm SD. $cP < 0.05$, FMT Model group vs. FMT Control group; $dP < 0.05$, FMT NR group vs. FMT Model group.



Supplementary Fig. 3 State of microglia and the levels of inflammatory cytokines in the recipient mice. (A) Representative double immunofluorescence confocal microscopy images of microglia stained for CD68 (red) and TMEM119 (green). Nuclei were counterstained with DAPI (blue). Scale bar = 20 μm. (B) Western blot analysis for CD68 and TMEM119 in the hippocampus of recipient mice (left); quantitative analysis of the western blot data (right); n = 5 mice per group; the experiment was performed three times. (C) The levels of pro-inflammatory cytokines in the brain of recipient mice; IL-1β (left), IL-6 (middle) and TNF-α (right). (D) The levels of anti-inflammatory cytokines in the brain of recipient mice; IL-10 (left) and TGF-β (right). The results are displayed as mean ± SD. $cP < 0.05$, FMT Model group vs. FMT Control group; $dP < 0.05$, FMT NR group vs. FMT Model group.



Supplementary Fig. 4 Levels of BDNF and TrkB, and the activation status of the Akt/GSK3 β / β -catenin signalling pathway in the recipient mice. (A) The levels of serum BDNF in the recipient mice. (B) Western blot analysis for BDNF and TrkB in the hippocampus of the recipient mice (left); quantitative analysis of the western blot data (right); n = 5 mice per group; the experiment was performed three times. (C) Western blot analysis for proteins related to the Akt/GSK3 β / β -catenin signalling pathway in the hippocampus of the recipient mice (left); quantitative analysis of the western blot data (right); n = 5 mice per group; the experiment was performed three times. Data are presented as means \pm SEM. $cP < 0.05$, FMT Model group vs. FMT Control group; $dP < 0.05$, FMT NR group vs. FMT Model group.