**Supplementary Table 1. Scanning methods and FA alterations of Bipolar Disorder studies included in this meta-analysis.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Study | Scanner | Diffusion encoding directions | Number of coordinates | b value (sec/mm2) | FA alterations |
| Ambrosi et al.2016 | 3.0T | 30 | 21 | 1000 | The Temporal lobe, R Subcallosal cortex, R Cingulate gyrus, Parietal lobe, Frontal lobe, Thalamic radiation, Occipital lobe |
| Benedetti et al.2011 | 3.0T | 35 | 2 | 900 | Genu of CC, R Dorsal cingulum |
| Canales-Rodríguez et al.2014 | 1.5T | 55 | 2 | 1500 | Body of CC, Genu of CC, Splenium of CC, Posterior cingulum, Thalami, R Posterior thalamic radiation, R Sagittal stratum, R Hippocampus, Parahippocampal gyrus, R Insula, R Anterior corona radiata, Fornix, anterior cingulate cortex, Anterior part of the cingulum bundle |
| Chan et al.2010 | 3.0T | 15 | 8 | 800 | R Posterior thalamic radiation, L Temporal white matter, L Cingulum, Sagittal striatum, L Anterior frontal white matter, L Genu of CC |
| Chang et al.2018 | 3.0T | 25 | 5 | 1000 | Middle cerebellar peduncle, Superior cerebellar peduncle, Body of CC, Genu of CC, Splenium of CC, Fornix R Cingulum, Anterior limb of internal capsule, L Posterior thalamic radiation, R Cerebral peduncle, R Posterior thalamic radiation, Right External capsule, L Superior longitudinal fasciculus |
| Gao et al.2013 | 3.0T | 30 | 1 | 1000 | R Anterior cingulate |
| Haarman et al.2016 | 3.0T | 32 | 0 | 1000 | - |
| Ishida et al.2017 | 3.0T | 15 | 1 | 1000 | CC, L Corona radiata |
| Ishida et al.2017 | 3.0T | 15 | 3 | 1000 | Body of CC, Genu of CC, Splenium of CC |
| Kumar et al.2015 | 3.0T | 32 | 3 | 1000 | Body of CC, L Posterior thalamic(optic) radiation, Forceps major, R Inferior fronto-occipital fasciculus |
| Lagopoulos et al.2013 | 3.0T | 69 | 6 | 1000 | Body of CC, Genu of CC, Splenium of CC, L Anterior corona radiata, R Superior corona radiata |
| Lan et al.2020 | 3.0T | NA | 0 | NA | - |
| Lee et al.2020 | 3.0T | 45 | 11 | 600 | Body of CC, L Posterior thalamic radiation, R Anterior limb of the internal capsule, R External capsule, Splenium of the corpus callosum, L External capsule, L Cingulum, L Posterior corona radiata, Fornix (acres), R Retrolenticular part of the internal capsule |
| Linke et al.2020 | 3.0T | 75 | 1 | 300,1000 | Cortico-spinal tract |
| Mahon et al.2013 | 3.0T | 31 | 3 | 1000 | R Temporal lobe |
| Mahon et al.2012 | 1.5T | 21 | 0 | 1000 | - |
| Mallas et al.2016 | 1.5T | NA | 1 | 1300 | Body of CC, Genu of CC, Splenium of CC, L Cerebral Peduncle; Retrolenticular part of the internal capsule;  Anterior corona radiata; L Superior corona radiata; Posterior thalamic radiation (include optic radiation); R Sagittal stratum (include inferior longitudinal fasciculus and inferior fronto-occipital fasciculus); L External capsule; L Superior longitudinal fasciculus |
| Sprooten et al.2013 | 3.0T | 55 | 7 | 800 | All of the 20 tracts from the Probabilistic Tractography Atlas and 45 out of 48 regions from the White Matter Labels Atlas (not the left tapetum and bilateral  hippocampal parts of the cingulum). |
| Singh et al.2023 | 3.0T | NA | 5 | 1000 | L Thalamus,R Precentral,R Precuneus,L CC,R Corticospinal tract |
| Thiel et al.2023 | 3.0T | NA | 3 | NA | Body of CC, forceps minor of CC |
| Tian et al.2021 | 3.0T | 20 | 7 | 1000 | Body of CC, Genu of CC, Inferior fronto-occipital fasciculus, Anterior thalamic radiation,Uncinate fasciculus, R Superior longitudinal fasciculus |
| Verkooijen et al.2017 | 3.0T | NA | 1 | NA | Body of CC, Genu of CC, Splenium of CC, Cerebral peduncle, Posterior limb of internal capsule, Retrolenticular part of internal capsule, Anterior corona radiata, Superior corona radiata, Posterior corona radiata, Posterior thalamic radiation (include optic  radiation), External capsule, cingulum (cingulate gyrus), Superior longitudinal fasciculus |
| Versace et al.2008 | 3.0T | 6 | 8 | 850 | Uncinate fasciculus, L Optic radiation , R Anterothalamic Radiation |
| Versace et al.2010 | 3.0T | 6 | 2 | 850 | Superior longitudinal fasciculi |
| Wessa et al.2009 | 1.5T | 41 | 7 | 700 | L frontal gyrus, R Precentral gyrus, Precuneus ⁄ inferior  parietal lobe, Superior occipital lobe ⁄ cuneus |
| Yang et al.2021 | 3.0T | 25 | 2 | 1000 ，2000 | Body of CC, Genu of CC, Anterior corona radiata, L Superior corona radiata |

NA: not applicable; FA: fractional anisotropy; Genu of CC: Genu of the corpus callosum; Body of CC: Body of corpus callosum; R, right; L, left.

**Supplementary Table 2. Scanning methods and FA alterations of major depression studies included in this meta-analysis.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Study | Scanner | Diffusion encoding directions | Number of coordinates | b value (sec/mm2) | FA alterations |
| Bergamino et al.2015 | 3.0T | 30 | 2 | 1000 | L Inferior longitudinal fasciculus |
| Bezerra et al.2012 | 1.5T | 25 | 0 | 1000 | - |
| Chen et al.2022 | 3.0T | 99 | 5 | 1000 | Superior frontooccipital fasciculus,Posterior limb of the internal capsule,Fornix tract |
| Cullen et al.2010 | 3.0T | 30 | 10 | 1000 | Middle frontal, Inferior Fronto-occipital fasciculus, Uncinate,L Cingulum, L Superior Longitudinal Fasciculus |
| Dong et al.2020 | 3.0T | 32 | 5 | 1000 | L Insula, L Middle Occipital gyrus, R Thalamus, L Pallidum, L Precuneus |
| Guo et al.2012 | 1.5T | 13 | 6 | 1000 | Anterior corona radiate, R External capsul, Genu of CC, Internal capsule |
| Guo et al.2012 | 1.5T | 13 | 2 | 1000 | Body of CC, R Anterior limb of the internal capsule, External capsule |
| Guo et al.2014 | 1.5 T | 13 | 2 | 1000 | Parahippocampal gyrus |
| Guo et al.2023 | 3.0T | 30 | 0 | NA | - |
| Han et al.2014 | 3.0T | 20 | 1 | 600 | Body of CC |
| Hayashi et al.2014 | 3.0T | 25 | 0 | 1000 | - |
| Henderson et al.2013 | 3.0T | 12 | 0 | 1000 | - |
| Bessetteet al.2013 | 3.0T | 12 | 56 | 1000 | Body of CC, Genu of CC, L Cingulum (cingulate gyrus), L Superior frontal gyrus, Anterior corona radiata, Superior corona radiata, L Frontal subgyral, L Middle frontal gyrus, L Inferior frontal gyrus, Orbitofrontal, Subcallosal gyrus, L Sagittal stratum, L Temporal subgyral, L Inferior temporal gyrus, L Middle temporal gyrus, L Medial temporal white matter, L Cingulum (posterior division), L Posterior thalamic radiation, Anterior/Posterior limbs of the internal capsule, Thalamus, R Anterior thalamic radiation, R Pallidum, L External capsule, L Retrolenticular part of the internal capsule, Brainstem corticospinal tract, Pontine crossing tract, Middle cerebellar peduncle, Crus I, Crus II |
| Kieseppä et al.2010 | 1.5T | 12 | 12 | 500,1000 | L Sagittal stratum, R Anterior cingulum, R Corpus callosum |
| Kieseppä et al.2021 | 3.0T | 32 | 1 | 1000 | R Cerebellar middle peduncle |
| Korgaonkar et al.2011 | 3.0T | 42 | 0 | 1250 | - |
| Lai et al.2014 | 3.0T | 30 | 2 | 900 | L Superior longitudinal fasciculus,R Anterior thalamic radiation |
| Lai et al.2016 | 3.0T | NA | 6 | NA | Inferior fronto-occipital fasciculus,Superior longitudinal fasciculus,Inferior longitudinal fasciculus, Corpus callosum |
| Lamar et al.2013 | 3.0T | 32 | 0 | 700 | - |
| Lee et al.2021 | 3.0T | 64 | 2 | 1000 | Body of CC, Genu of CC, Anterior corona radiata, external capsule |
| Li et al.2020 | 3.0T | 64 | 5 | NA | Inferior fronto-occipital fasciculus,Anterior thalamic radiation,R Uncinate fasciculus,L Inferior longitudinal fasciculus ,L Superior longitudinal fasciculus ,Forceps major |
| Li et al.2022 | 3.0T | 64 | 2 | 1500 | Anterior limb of internal capsule,Posterior limb of internal capsule |
| Liu et al.2016 | 3.0T | 25 | 7 | 1000 | Corticospinal tract,R Superior corona radiata,L Inferior fronto-occipital fasciculus,L Uncinate fasciculus,L External capsule,L Anterior thalamic radiation |
| Ma et al.2023 | 3.0T | NA | 2 | 1000 | R Cerebral peduncle,Body of CC |
| Ming et al.2022 | 3.0T | 30 | 4 | 1000 | Body of CC,Genu of CC,L Superior coronal radiate,L Anterior corona radiata |
| Murphy et al.2012 | 3.0T | 61 | 4 | 1200 | Genu of CC,Inferior longitudinal fasciculus, Cingulum, Uncinate fasciculus,R Superior Longitudinal Fasciculus |
| Ping, et al.2019 | 3.0T | 33 | 5 | 1000 | Body of CC, Genu of CC, anterior corona radiate, R. superior corona radiate |
| Repple et al.2019 | 3.0T | 20 | 0 | 1000 | - |
| Sammer et al.2022 | 3.0T | 64 | 0 | 2000 | - |
| Shuster et al.2023 | 3.0T | NA | 0 | 500,1000,2000,3000 | - |
| Seok et al.2013 | NA | 20 | 4 | 600 | R Superior longitudinal fasciculus (occipital lobe), Genu of CC,L Cingulum (cingulate gyrus),R Posterior thalamic radiation (forceps major) |
| Sohn et al.2018 | 3.0T | 51 | 17 | 900 | Body of CC,Genu of CC,L Cerebral peduncle,Frontal lobe WM, Superior corona radiata,L Anterior corona radiata, Anterior corona radiata,L Posterior limb of internal capsul,L Posterior thalamic radiation, Superior longitudinal fasciculus,L Anterior limb of internal capsule,LSuperior fronto-occipital fasciculus,L External capsule |
| Sugimoto et al.2018 | 3.0T | 25 | 4 | 1000 | Anterior thalamic radiation,Inferior fronto-occipital fasciculus, Corticospinal tract, Forceps minor |
| Taylor et al.2015 | 3.0T | 20 | 3 | 1000 | Splenium of CC, R. Corticospinal tract, R. Anterior thalamic radiation |
| Vai et al.2020 | 3.0T | 35 | 2 | 900 | R Corticospinal tract ,R Anterior thalamic radiation ,Uncinate fasciculus , Inferior fronto-occipital fasciculus , Superior longitudinal fasciculus ,Inferior longitudinal fasciculus ,Forceps minor |
| Vandeloo et al.2023 | 3.0T | 64 | 5 | 1000 | Inferior fronto-occipital fasciculus,Superior cerebellar peduncle,Corticospinal tract,Anterior thalamic radiation |
| Versace et al.2010 | 3.0T | 6 | 1 | 850 | L Inferior longitudinal fasciculus |
| Wang et al.2014 | 3.0T | 12 | 1 | 1000 | L superior longitudinal fasciculus |
| Winter et al.2023 | 3.0T | NA | 2 | 1000 | Forceps minor,Superior longitudinal fasciculus, |
| Wu et al.2023 | 3.0T | 32 | 3 | 1000 | Body of CC,Genu of CC, Anterior corona radiata,Superior corona radiata,Posterior corona radiata,Posterior thalamic radiation |
| Xiao et al.2015 | 1.5T | 13 | 10 | 1000 | Cerebral peduncle, Anterior limb of the internal, L Capsule, External capsule, L Posterior limb of the internal capsule, L Retrolenticular part of the internal capsule, Body of CC, Splenium of CC, L Superior corona radiata, L Posterior corona radiata, Cingulum |
| Yang et al.2017 | 3.0T | 30 | 2 | 1000 | Cingulum, Forceps minor |
| Zhang et al.2022 | 3.0T | 32 | 7 | 1000 | Genu of CC,Splenium of CC,Body of CC,Anterior corona radiate,Superior longitudinal fasciculus,Posterior coron aradiate,Posteriorthalamicradiatio,Retrolenticular part of internal capsule,,Superior corona radiate,L External capsule |
| Zhao et al.2024 | 3.0T | NA | 5 | NA | L Superior longitudinal fasciculus,R Inferior fronto-occipital fasciculus,R Superior longitudinal fasciculus,L Superior longitudinal fasciculus |
| Zhu et al.2011 | 1.5T | 13 | 3 | 1000 | L Anterior limb of the internal capsule, R Parahippocampal gyrus, L Posterior cingulate cortex |
| Zuo et al.2012 | 1.5T | 25 | 2 | 900 | Superior longitudinal fasciculus,Premotor area |

NA: not applicable;FA:fractional anisotropy;Genu of CC: Genu of corpus callosum;Body of CC: Body of corpus callosum; R, right; L, left.

**Supplementary Table 3. Publication bias.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Disorder | bias | T-value | df | p |
| MDD | -0.02 | -0.13 | 45 | 0.900 |
|  | -0.22 | -0.90 | 45 | 0.375 |
|  | -0.29 | -1.05 | 45 | 0.301 |
|  | -0.26 | -1.04 | 45 | 0.303 |
|  | -0.22 | -0.70 | 45 | 0.489 |
| BD | 0.14 | 0.27 | 24 | 0.788 |
|  | -0.23 | -0.46 | 24 | 0.650 |
|  | -0.02 | -0.04 | 24 | 0.967 |

**Supplementary Table 4. The subgroup meta-analysis of studies on the adult group of MDD patients.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regions |  | | Maximum | | | | Cluster  Number of voxels | Breakdown (number of voxels) |
|  | MNI coordinates | | | | *SDM -Z* | *P* value |  |  |
|  | X | Y | | Z |  |  |  |  |
| Corpus callosum | -14 | 24 | | 18 | -2.004 | ~0 | 257 | Corpus callosum(234)  Left anterior thalamic projections(17)  Left striatum(5)  Left median network, cingulum(1) |
| Left superior longitudinal fasciculus II | -32 | -16 | | 34 | -1.079 | 0.000220776 | 14 | Left superior longitudinal fasciculus II(14) |

MNI: Montreal Neurological Institute.

**Supplementary Table 5. The subgroup meta-analysis of studies on the adult group of BD patients.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regions |  | | Maximum | | | | Cluster  Number of voxels | Breakdown (number of voxels) |
|  | MNI coordinates | | | | *SDM -Z* | *P* value |  |  |
|  | X | Y | | Z |  |  |  |  |
| Left hippocampus, BA 27 | -20 | -32 | | -2 | 1.296 | 0.000024557 | 33 | Left optic radiations(21)  Left hippocampus, BA 27(5)  Corpus callosum(3)  Left hippocampus, BA 37(2)  Left hippocampus(1)  Left hippocampus, BA 20(1) |
| Left median network,cingulum | -24 | -36 | | -10 | 1.295 | 0.000049055 | 17 | Left median network, cingulum(8)  Left parahippocampal gyrus, BA 37(6)  Corpus callosum(3) |
| Corpus callosum | 8 | -28 | | 16 | -1.746 | 0.000073612 | 29 | Right thalamus(11)  Right anterior thalamic projections(9)  Corpus callosum(5)  (undefined)(4) |
| Corpus callosum | -8 | 28 | | 16 | -1.803 | 0.000049055 | 25 | Left thalamus(14)  Corpus callosum(6)  Left anterior thalamic projections(3)  (undefined)(2) |
| Corpus callosum | 6 | 14 | | 20 | -1.537 | 0.000318885 | 18 | Corpus callosum(18) |

**Supplementary Table 6. The subgroup meta-analysis of studies on BD Type I group of BD patients.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regions |  | | Maximum | | | | Cluster  Number of voxels | Breakdown (number of voxels) |
|  | MNI coordinates | | | | *SDM -Z* | *P* value |  |  |
|  | X | Y | | Z |  |  |  |  |
| Corpus callosum | 8 | -28 | | 16 | -1.766 | ~0 | 117 | Right thalamus(57)  Corpus callosum(19)  Left thalamus(16)  Right anterior thalamic projections(11)  Left anterior thalamic projections(5)  Right hippocampus(2)  (undefined)(7) |
| Corpus callosum | 0 | -14 | | 20 | -1.409 | 0.000049055 | 15 | Corpus callosum(15) |

**Supplementary Table 7. The subgroup meta-analysis of studies on the remission phase group of BD patients.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regions |  | | Maximum | | | | Cluster  Number of voxels | Breakdown (number of voxels) |
|  | MNI coordinates | | | | *SDM -Z* | *P* value |  |  |
|  | X | Y | | Z |  |  |  |  |
| Left superior longitudinal fasciculus II | -38 | -28 | | 48 | -1.049 | 0.000147164 | 33 | Left superior longitudinal fasciculus II(18)  Left postcentral gyrus, BA 3(13)  Left postcentral gyrus, BA 4(1)  Left hand superior U tract(1) |

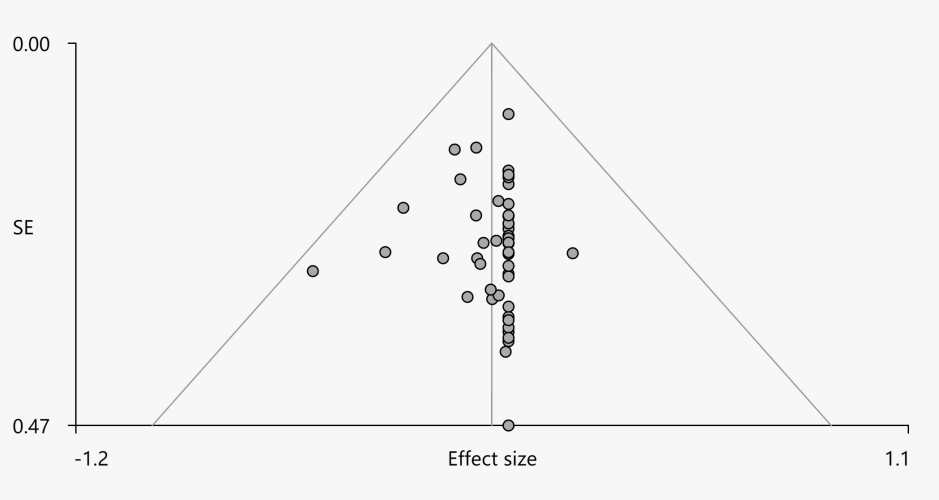
**Supplementary Table 8. The subgroup meta-analysis of studies on the depressive episode group of BD patients.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regions |  | | Maximum | | | | Cluster  Number of voxels | Breakdown (number of voxels) |
|  | MNI coordinates | | | | *SDM -Z* | *P* value |  |  |
|  | X | Y | | Z |  |  |  |  |
| Corpus callosum | 48 | -22 | | 2 | 1.045 | 0.000122666 | 21 | Corpus callosum(21) |
| Corpus callosum | -12 | -26 | | 28 | -1.489 | 0.000196218 | 41 | Corpus callosum(24)  Left median network, cingulum(17) |

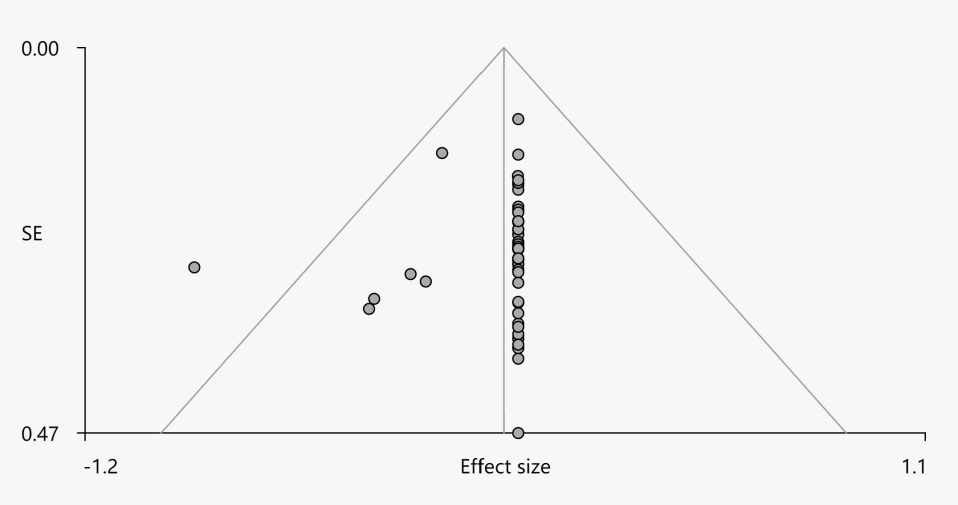
**Supplementary Fig.1. Funnel plots.**

1. MDD

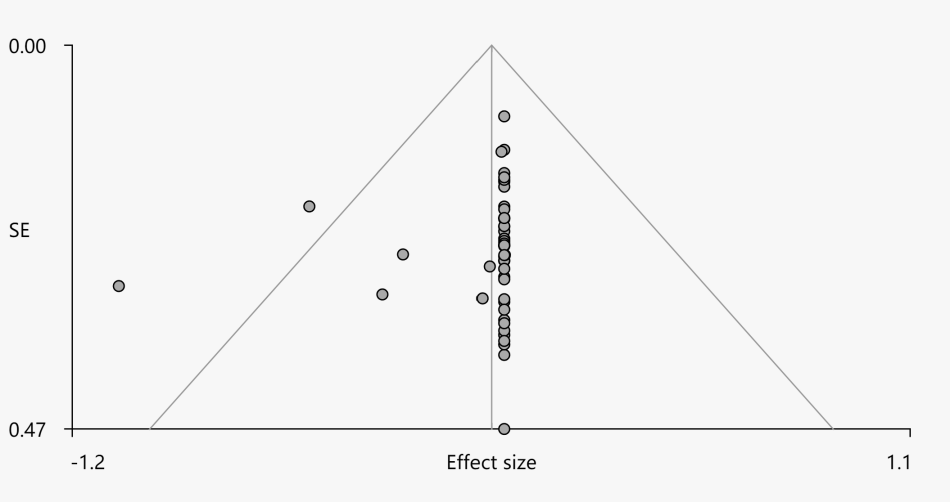
Blob1



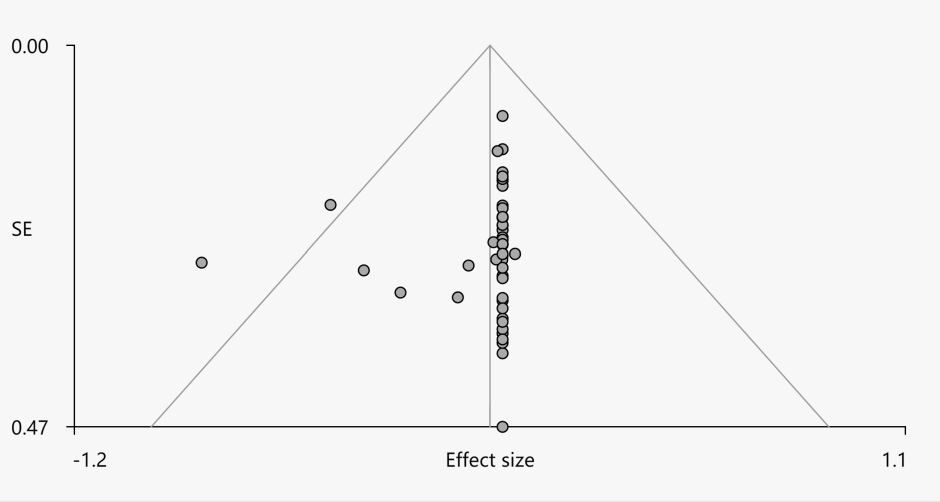
Blob2



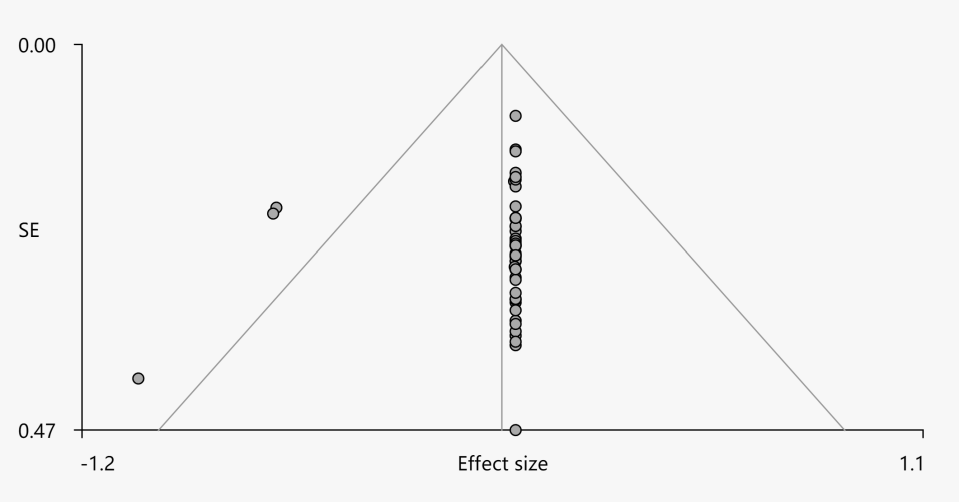
Blob3



Blob4

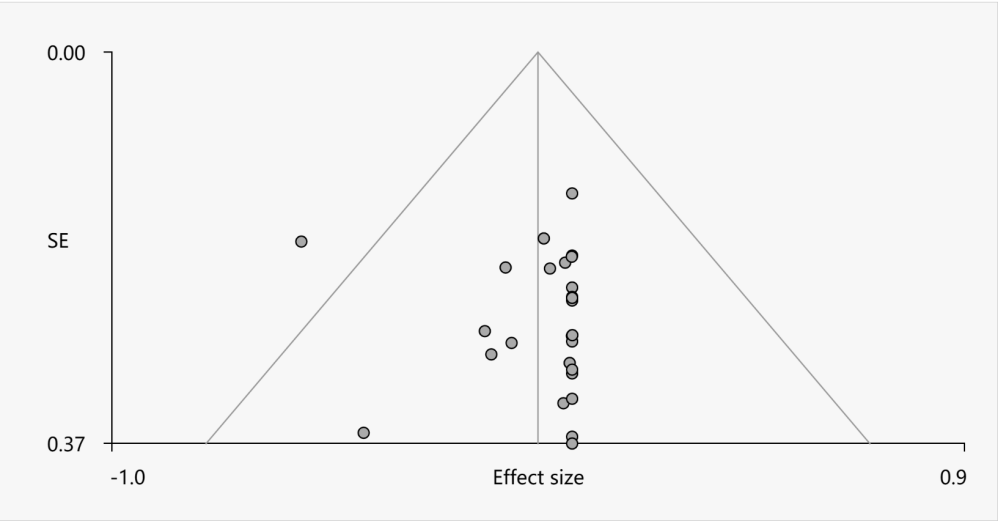


Blob5

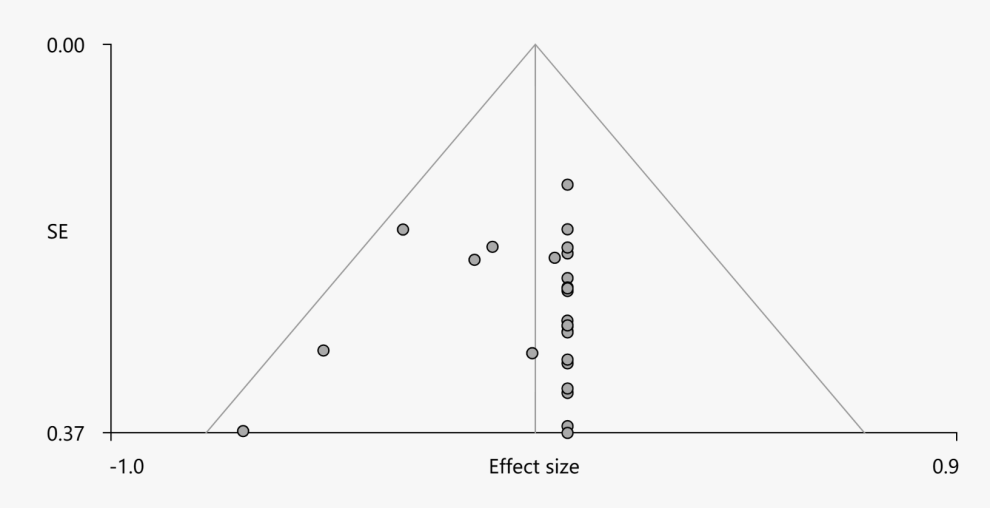


1. BD

Blob1



Blob2



Blob3

