SUPPLEMENTARY TABLES

Supplementary Table 1. Bias of the 11 studies included in this meta-analysis based on RoBANS.

| Study            | The selection of participants | Confounding variables | Measurement of exposure | Blinding of outcome assessments | Incomplete outcome data | Selective outcome reporting |
|------------------|--------------------------------|-----------------------|-------------------------|---------------------------------|-------------------------|-----------------------------|
| Vogt et al. (2017) | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Zhuang et al. (2018) | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Haran et al. (2019) | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Li et al. (2019)   | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Liu et al. (2019)  | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Nagpal et al. (2019) | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Hou et al. (2021)  | Low risk                       | Low risk              | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Liu et al. (2021)  | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Sheng et al. (2021) | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Zhang et al. (2021) | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |
| Zhou et al. (2021) | Low risk                       | High risk             | Low risk                | Low risk                        | Low risk                | Low risk                    |

Abbreviation: RoBANS: Risk of Bias Assessment tool for Non-randomized Studies.

Supplementary Table 2. Publication bias assessments.

| Taxonomic Level | Begg and Mazumdar rank correlation | Egger’s regression intercept test | Duval and Tweedie’s trim and fill |
|-----------------|-----------------------------------|----------------------------------|----------------------------------|
|                 | Tau  | P value | Intercept | P value | Observed Hedges’ g | Adjusted Hedges’ g |
| Phylum-Actinobacteria | 0.500 | 0.308 | 15.608 | 0.353 |                     |                     |
| Phylum-Bacteroidetes | 0.178 | 0.536 | 7.657 | 0.301 |                     |                     |
| Phylum-Firmicutes | 0.266 | 0.452 | 14.817 | 0.131 |                     |                     |
| Phylum-Proteobacteria | 0.133 | 0.707 | −3.045 | 0.857 |                     |                     |
| Class_Bacteroidia | 0.167 | 0.734 | 3.750 | 0.265 | −0.208 [−0.464, 0.047] | −0.292 [−0.568, −0.017] |
| Class_Clostridia | 0.500 | 0.220 | 21.963 | 0.081 | 1.038 [−0.392, 2.468] | 0.530 [−0.881, 1.941] |
| Class_Gammaproteobacteria | 0.133 | 0.707 | −2.684 | 0.883 |                     |                     |
| Order_Bacteroidales | 0.167 | 0.734 | 5.490 | 0.448 | −0.229 [−0.521, 0.064] | −0.334 [−0.643, −0.025] |
| Order_Clostridiales | 0.400 | 0.259 | 13.807 | 0.139 | 1.038 [−0.392, 2.468] | 0.530 [−0.881, 1.941] |
| Order_Entorhodobacteria | 0.000 | 1.000 | −8.140 | 0.633 |                     |                     |
| Family_Bacteroidaceae | 0.167 | 0.734 | 0.539 | 0.970 |                     |                     |
| Family_Clostridiaceae | −0.100 | 0.806 | −2.793 | 0.349 |                     |                     |
| Family_Entorhodobacteria | 0.000 | 1.000 | −4.253 | 0.717 |                     |                     |
| Family_Rikenellaceae | 0.400 | 0.259 | 13.807 | 0.139 | 1.038 [−0.392, 2.468] | 0.530 [−0.881, 1.941] |
| Genus_Alistipes | 0.000 | 1.000 | −4.501 | 0.686 |                     |                     |
| Genus_Bacteroides | −0.178 | 0.536 | −12.118 | 0.245 |                     |                     |
| Genus_Bifidobacterium | 0.000 | 1.000 | 16.626 | 0.309 |                     |                     |
| Genus_Bifidobacterium | −0.285 | 0.367 | 2.562 | 0.817 |                     |                     |
| Genus_Phascolarctobacterium | −0.500 | 0.220 | −3.835 | 0.326 |                     |                     |

Note: the observed and adjusted effects sizes were reported only when missing studies were found and corrected by Duval and Tweedie’s trim and fill. The Hedges’ g was presented as overall effect size [lower limit, upper limit].