

Table S1: The research question and detailed selection criteria

Research question – Does probiotics administration decrease cortisol levels in the participants? Null Hypothesis (H0): Probiotics do not decrease cortisol levels Alternative Hypothesis (H1): Probiotics decrease cortisol levels		
Inclusion		Exclusion
Participants	Participants of all age groups. No specific medical condition or disorder requirement.	Animals, in vitro, or other non-human studies
Intervention	Studies involving the administration of probiotics Probiotic interventions can be standalone or part of a combination therapy	Studies using prebiotics, synbiotics, or postbiotics without a specific focus on probiotics. Studies where probiotics are part of a complex treatment regimen making it challenging to isolate probiotic effects.
Comparison	Studies with a control group that did not receive probiotics (placebo or standard treatment).	Exclude studies lacking a clear control or comparison group. Yogurt or other fermented foods in which specific probiotic organisms were not identified.
Outcome	Salivary/plasma/serum/urinary/fecal cortisol	Studies not assessing the effects of probiotics
Time point	For the studies evaluating stress, the samples analyzed just before or after time point maximum stress are included. Also, the sample within or at 30 min after waking up in case of morning sample, or if only one sample is taken, or Cmax	Measurement taken during the follow-up period
Study Designs	RCT Geography-Global level Date of Search- Published till Language: English	Exclude non-randomized studies, observational studies, case reports, reviews, and other non-RCT designs. Language: Non-English

Table S2: Key words and the adjusted search terms as per searched electronic databases [updated on 08/13/2024]

List of key concepts, synonyms, and acronyms			
Probiotics, psychobiotics, prebiotics, synbiotics, lactobacillus, bifidobacterium, saccharomyces, streptococcus, enterococcus, Propionibacterium, bacillus, lacticaseibacillus			
Database	No.	Search Query	Results
Pubmed	#1	prebiotics[MeSH Terms] OR "prebiotic*" [Title/Abstract] OR "synbiotics"[MeSH Terms] OR "synbiotic*" [Title/Abstract] OR "probiotics"[MeSH Terms] OR "probiotic*" [Title/Abstract] OR "bifidobacterium"[MeSH Terms] OR "bifidobacter*" [Title/Abstract] OR "saccharomyces"[MeSH Terms] OR "saccharomyc*" [Title/Abstract] OR "streptococcus"[MeSH Terms] OR "streptococc*" [Title/Abstract] OR "enterococcus"[MeSH Terms] OR "enterococc*" [Title/Abstract] OR "propionibacterium"[MeSH Terms] OR "propionibacteri*" [Title/Abstract] OR "Lacticaseibacillus"[MeSH Terms] OR "lacticaseibacill*" [Title/Abstract] OR "bacillus"[MeSH Terms] OR "bacill*" [Title/Abstract] OR "lactobacillus"[MeSH Terms] OR "lactobacill*" [Title/Abstract] OR "psychobiotic*" [Title/Abstract]	555,734
	#2	hydrocortisone[MeSH Terms] OR "cortisol" [Title/Abstract]	107,394
	#3	randomized controlled trial[Publication Type] OR "controlled clinical trial"[Publication Type] OR "randomized" [Title/Abstract] OR "randomised" [Title/Abstract] OR "placebo" [Title/Abstract] OR "drug therapy"[MeSH Subheading] OR "randomly" [Title/Abstract] OR "trial" [Title/Abstract] OR "groups" [Title/Abstract]	6,143,817
	#4	#1 AND #2 AND #3	251
	#5	#1 AND #2 AND #3 Filters: Humans	94
	#6	#1 AND #2 AND #3 Filters: Humans, English	88
	#7	("meta-analysis"[Publication Type] OR "systematic review"[Publication Type] OR "review"[Publication Type]) Filter:English, Humans	6,670
	#8	#6 NOT #7	88

EMBASE	#1	'prebiotic agent'/exp OR 'prebiotic*':ti,ab,kw OR 'synbiotic agent'/exp OR 'synbiotic*':ti,ab,kw OR 'probiotic agent'/exp OR 'probiotic*':ti,ab,kw OR 'Bifidobacterium'/exp OR 'bifidobacter*':ti,ab,kw OR 'Saccharomyces'/exp OR 'saccharomyc*':ti,ab,kw OR 'Streptococcus'/exp OR 'streptococc*':ti,ab,kw OR 'Enterococcus'/exp OR 'enterococc*':ti,ab,kw OR 'Propionibacterium'/exp OR 'propionibacteri*':ti,ab,kw OR 'Lactacaseibacillus'/exp OR 'lactacaseibacill*':ti,ab,kw OR 'Bacillus'/exp OR 'bacill*':ti,ab,kw OR 'Lactobacillus'/exp OR 'lactobacill*':ti,ab,kw OR 'psychobiotic*':ti,ab,kw	719,176
	#2	'hydrocortisone'/exp OR 'cortisol':ti,ab,kw	195,047
	#3	'randomized controlled trial':it OR 'controlled clinical trial':it OR 'randomized':ti,ab,kw OR 'randomised':ti,ab,kw OR 'placebo':ti,ab,kw OR 'drug therapy' OR 'randomly':ti,ab,kw OR 'trial':ti,ab,kw OR 'groups':ti,ab,kw	10,292,486
	#4	#1 AND #2 AND #3	1,321
	#5	#1 AND #2 AND #3 Filters: Humans	1,063
	#6	#1 AND #2 AND #3 Filters: Humans, English	1,001
	#7	('meta-analysis':it OR 'systematic review':it OR 'review':it)	3,289,298
	#8	#7 NOT #8	739
Scopus	#1	INDEXTERMS(prebiotics) OR TITLE-ABS(prebiotic*) OR INDEXTERMS(synbiotics) OR TITLE-ABS(synbiotic*) OR INDEXTERMS(probiotics) OR TITLE-ABS(probiotic*) OR INDEXTERMS(bifidobacterium) OR TITLE-ABS(bifidobacter*) OR INDEXTERMS(saccharomyces) OR TITLE-ABS(saccharomyc*) OR INDEXTERMS(streptococcus) OR TITLE-ABS(streptococc*) OR INDEXTERMS(enterococcus) OR TITLE-ABS(enterococc*) OR INDEXTERMS(propionibacterium) OR TITLE-ABS(propionibacteri*) OR INDEXTERMS(Lactacaseibacillus) OR TITLE-ABS(lactacaseibacill*) OR INDEXTERMS(bacillus) OR TITLE-ABS(bacill*) OR INDEXTERMS(lactobacillus) OR TITLE-ABS(lactobacill*) OR TITLE-ABS(psychobiotic*)	862,989
	#2	INDEXTERMS(hydrocortisone) OR TITLE-ABS(cortisol)	182,104
	#3	DOCTYPE ("Clinical Trial") OR INDEXTERMS ("Clinical Trials as Topic") OR TITLE-ABS ("randomised clinical trial") OR TITLE-ABS ("randomized clinical trial") OR TITLE-ABS (randomi*) OR TITLE-ABS ("randomised trial") OR TITLE-ABS ("randomized trial") OR TITLE-ABS ("Clinical Trial") OR TITLE-ABS (intervention) OR TITLE-ABS ("control study")	3,315,551

	#4	#1 AND #2 AND #3	301
	#5	#1 AND #2 AND #3 Filters: Humans, English	248
	#6	TITLE(meta-analysis) OR TITLE("systematic review") OR TITLE(review)	1,435,705
	#7	#5 not #6	215
Web of Science	#1	ALL=prebiotics OR (TI=prebiotic* OR AB=prebiotic*) OR ALL=synbiotics OR (TI=synbiotic* OR AB=synbiotic*) OR ALL=probiotics OR (TI=probiotic* OR AB=probiotic*) OR ALL=bifidobacterium OR (TI=bifidobacter* OR AB=bifidobacter*) OR ALL=saccharomyces OR (TI=saccharomyc* OR AB=saccharomyc*) OR ALL=streptococcus OR (TI=streptococc* OR AB=streptococc*) OR ALL=enterococcus OR (TI=enterococc* OR AB=enterococc*) OR ALL=propionibacterium OR (TI=propionibacteri* OR AB=propionibacteri*) OR ALL=Lacticaseibacillus OR (TI=lacticaseibacill* OR AB=lacticaseibacill*) OR ALL=bacillus OR (TI=bacill* OR AB=bacill*) OR ALL=lactobacillus OR (TI=lactobacill* OR AB=lactobacill*) OR (TI=psychobiotic* OR AB=psychobiotic*)	683,338
	#2	ALL=hydrocortisone OR (TI=cortisol OR AB=cortisol)	96,685
	#3	ALL="randomized controlled trial" OR ALL="controlled clinical trial" OR (TI=randomized OR AB=randomized) OR (TI=randomised OR AB=randomised) OR (TI=placebo OR AB=placebo) OR ALL="drug therapy" OR (TI=randomly OR AB=randomly) OR (TI=trial OR AB=trial) OR (TI=groups OR AB=groups)	7,932,475
	#4	#1 AND #2 AND #3	342
	#5	#1 AND #2 AND #3 Filters:English	338
	#6	(TI=meta-analysis OR TI="systematic review" OR TI=review)	1,169,298
	#7	#5 NOT #6	331
CINAHL	#1	(MH prebiotics+) OR (TI prebiotic* OR AB prebiotic*) OR (MH synbiotics+) OR (TI synbiotic* OR AB synbiotic*) OR (MH probiotics+) OR (TI probiotic* OR AB probiotic*) OR (MH bifidobacterium+) OR (TI bifidobacter* OR AB bifidobacter*) OR (MH saccharomyces+) OR (TI saccharomyc* OR AB saccharomyc*) OR (MH streptococcus+) OR (TI streptococc* OR AB streptococc*) OR (MH enterococcus+) OR (TI enterococc* OR AB enterococc*) OR (MH propionibacterium+) OR (TI propionibacteri* OR AB	39,856

		propionibacteri*) OR (MH Lacticaseibacillus+) OR (TI lacticaseibacill* OR AB lacticaseibacill*) OR (MH bacillus+) OR (TI bacill* OR AB bacill*) OR (MH lactobacillus+) OR (TI lactobacill* OR AB lactobacill*) OR (TI psychobiotic* OR AB psychobiotic*)	
	#2	(MH hydrocortisone+) OR (TI cortisol OR AB cortisol)	13,470
	#3	((MH randomized controlled trials OR MH double-blind studies OR MH single-blind studies OR MH random assignment OR MH pretest-posttest design OR MH cluster sample OR TI (randomised OR randomized) OR AB (random*) OR TI (trial) OR (MH (sample size) AND AB (assigned OR allocated OR control)) OR MH (placebos) OR PT (randomized controlled trial) OR AB (control W5 group) OR MH (crossover design) OR MH (comparative studies) OR AB (cluster W3 RCT)) NOT ((MH animals+ OR MH animal studies OR TI (animal model*)) NOT MH human)) OR (TX allocat* random* OR (MH "Quantitative Studies") OR (MH "Placebos") OR TX placebo* OR TX random* allocat* OR (MH "Random Assignment") OR TX randomi* control* trial* OR TX ((singl* N1 blind*) or (singl* N1 mask*)) OR TX ((doubl* N1 blind*) or (doubl* N1 mask*)) OR TX ((tripl* N1 blind*) or (tripl* N1 mask*)) OR TX ((trebl* N1 blind*) or (trebl* N1 mask*)) OR (TX clinic* N1 trial*) OR PT Clinical trial OR (MH "Clinical Trials+"))	2,473,129
	#4	#1 AND #2 AND #3	32
	#5	#1 AND #2 AND #3 Filter:English	32
Cochrane Library	#1	[mh prebiotics] OR prebiotic*:ti,ab OR [mh synbiotics] OR synbiotic*:ti,ab OR [mh probiotics] OR probiotic*:ti,ab OR [mh bifidobacterium] OR bifidobacter*:ti,ab OR [mh saccharomyces] OR saccharomyc*:ti,ab OR [mh streptococcus] OR streptococc*:ti,ab OR [mh enterococcus] OR enterococc*:ti,ab OR [mh propionibacterium] OR propionibacteri*:ti,ab OR [mh Lacticaseibacillus] OR lacticaseibacill*:ti,ab OR [mh bacillus] OR bacill*:ti,ab OR [mh lactobacillus] OR lactobacill*:ti,ab OR psychobiotic*:ti,ab	23,686
	#2	[mh hydrocortisone] OR cortisol:ti,ab	17,453
	#3	#1 AND #2	166
	#4	#1 AND #2 Filters:Only trials	166

	#5	#1 AND #2 Filters:Only trials, English	162
Proquest	#1	TI,AB(prebiotic*) OR TI,AB(synbiotic*) OR TI,AB(probiotic*) OR TI,AB(bifidobacter*) OR TI,AB(saccharomyc*) OR TI,AB(streptococc*) OR TI,AB(enterococc*) OR TI,AB(propionibacteri*) OR TI,AB(lacticaseibacill*) OR TI,AB(bacill*) OR TI,AB(lactobacill*) OR TI,AB(psychobiotic*)	220,407
	#2	TI,AB(cortisol) OR TI,AB(hydrocortisone)	32,507
	#3	NOFT("randomized controlled trial") OR NOFT("controlled clinical trial") OR TI,AB(randomized) OR TI,AB(randomised) OR TI,AB(placebo) OR NOFT("drug therapy") OR TI,AB(randomly) OR TI,AB(trial) OR TI,AB(groups)	16,242,149
	#4	#1 AND #2 AND #3	173
	#5	#1 AND #2 AND #3 Filter:English	172
	#6	#5 Available literature	171
WoS Preprint Citation Index	#1	(TI=prebiotic* OR AB=prebiotic*) OR (TI=synbiotic* OR AB=synbiotic*) OR (TI=probiotic* OR AB=probiotic*) OR (TI=bifidobacter* OR AB=bifidobacter*) OR (TI=saccharomyc* OR AB=saccharomyc*) OR (TI=streptococc* OR AB=streptococc*) OR (TI=entero cocc* OR AB=enterococc*) OR (TI=propionibacteri* OR AB=propionibacteri*) OR (TI=lacticaseibacill* OR AB=lac ticaseibacill*) OR (TI=bacill* OR AB=bacill*) OR (TI=lactobacill* OR AB=lactobacill*) OR (TI=psychobiotic * OR AB=psychobiotic*)	5,057
	#2	(TI=cortisol OR AB=cortisol) OR (TI = hydrocortisone OR AB = hydrocortisone)	137
	#3	(TI=randomized OR AB=randomized) OR (TI=randomised OR AB=randomised) OR (TI=placebo OR AB=placebo) OR (TI=randomly OR AB=randomly) OR (TI=trial OR AB=trial) OR (TI=groups OR AB=groups)	223,095
	#4	#1 AND #2 AND #3	2

Table S3: List of studies excluded after full-text assessment and reasons for exclusion

Title	Study	Identifier	Notes
Probiotic Mixture Containing Lactobacillus helveticus , Bifidobacterium longum and Lactiplantibacillus plantarum Affects Brain Responses to an Arithmetic Stress Task in Healthy Subjects: A Randomised Clinical Trial and Proof-of-Concept Study.	EdebolCarlman 2022	https://www.mdpi.com/2072-6643/14/7/1329	Wrong intervention
Influence of mechanical debridement with adjunct probiotic therapy on clinical status and salivary cortisol levels in patients with periodontal inflammation.	Alhamoudi 2023	https://www.europeanreview.org/article/33758	Wrong study design/non-randomized
Multi-Strain Probiotic Mixture Affects Brain Morphology and Resting State Brain Function in Healthy Subjects: An RCT.	Rode 2022	https://www.mdpi.com/2073-4409/11/18/2922	Wrong intervention
Lactobacillus rhamnosus CNCM I-3690 decreases subjective academic stress in healthy adults: a randomized placebo-controlled trial.	Wauters 2022	https://onlinelibrary.wiley.com/doi/10.1111/nmo.13671	data not available
The Effect of a Probiotic Complex on the Gut-Brain Axis: A Translational Study.	Nobile 2022	https://karger.com/nps/article-abstract/81/2/116/828847/The-Effect-of-a-Probiotic-Complex-on-the-Gut-Brain?redirectedFrom=fulltext	Wrong intervention
The alteration of stress-related physiological parameters after probiotics administration in oral surgeons with different degrees of surgical experience.	Pacifici 2020	https://www.clinicaterapeutica.it/2020/171/3/05_BALLINI-INCHINGOLO.pdf	data not available

Bifidobacterium longum 1714 strain Modulates Brain Activity of Healthy Volunteers During Social Stress.	Wang 2019	https://journals.lww.com/ajg/fulltext/2019/07000/bifidobacterium_longum_1714_strain_modulates.25.aspx	Wrong outcomes
Effects Of A Probiotic Formulation After Experimentally Induced Stress In An Adult Population	QuesadaRodriguez 2023	https://linkinghub.elsevier.com/retrieve/pii/S2405457722010622	Abstract/Posters
Feed your microbes to deal with stress: a psychobiotic diet impacts microbial stability and perceived stress in a healthy adult population	Berding 2023	https://www.nature.com/articles/s41380-022-01817-y	Wrong intervention
Interactions between symptoms and psychological status in irritable bowel syndrome: An exploratory study of the impact of a probiotic combination	Groeger 2023	https://onlinelibrary.wiley.com/doi/10.1111/nmo.14477	Wrong study design/non-randomized
Effects of the multidomain intervention with nutritional supplements on cognition and gut microbiome in early symptomatic Alzheimer's disease: a randomized controlled trial	Lee 2023	https://www.frontiersin.org/journals/aging-neuroscience/articles/10.3389/fnagi.2023.1266955/full	Wrong intervention
Efficacy of a food supplement based on S-adenosyl methionine and probiotic strains in subjects with subthreshold depression and mild-to-moderate depression: A monocentric, randomized, cross-over, double-blind, placebo-controlled clinical trial	Ullah 2022	https://www.sciencedirect.com/science/article/pii/S0753332222013191?via%3Dihub	Wrong intervention
Microbiome Modulators and Mood Disorders: Using a Multi-Strain Probiotic - Bio-Kult® Advanced - in Patients With Low Mood	Aswani 2022	https://www.cambridge.org/core/journals/bjpsychopen/article/microbiome-modulators-and-mood-disorders-using-a-multistrain-probiotic-biokult-advanced-in-patients-with-low-mood/FC5978D81CABCD5E5D088441F248F9DF	Abstract/Posters

Routine Administration of a Multispecies Probiotic Containing Bifidobacterium and Lactobacillus to Very Low Birth Weight Infants Had No Significant Impact on the Incidence of Necrotizing Enterocolitis	Juber 2021	https://www.frontiersin.org/journals/pediatrics/articles/10.3389/fped.2021.757299/full	Wrong study design/non-randomized
Probiotics-induced changes in gut microbial composition and its effects on cognitive performance after stress: exploratory analyses	Bloemendaal 2021	https://www.nature.com/articles/s41398-021-01404-9	Wrong study design/non-randomized
Efficacy of a multispecies probiotic as adjunctive therapy in generalized anxiety disorder: a double blind, randomized, placebo-controlled trial	Eskandarzadeh 2021	https://www.tandfonline.com/doi/full/10.1080/1028415X.2019.1598669	data not available
LB946 Improvements in acne-prone skin quality correlate with a reduction in saliva cortisol levels after use of an 8-week 3-step topical regimen	Skobowiat 2020	https://linkinghub.elsevier.com/retrieve/pii/S0022202X20315335	Abstract/Posters
Effect of lactobacillus rhamnosus strain on stress-related intestinal permeability in healthy adults (ProSPer): A randomized, doubleblind placebo-controlled trial	Wauters 2019	https://onlinelibrary.wiley.com/doi/10.1111/nmo.13671	Abstract/Posters
Differences in psychosocial behavior, salivary IgA, and oral microbiota in student-athletes and sedentary college students	Costan 2018	https://journals.aai.org/jimmunol/article/200/1_Supplement/118.17/59913/Differences-in-psychosocial-behavior-salivary-IgA	Abstract/Posters
Effect of coordinated probiotic/prebiotic/phytobiotic supplementation on microbiome balance and psychological mood state in healthy stressed adults	Talbott 2018	https://faseb.onlinelibrary.wiley.com/doi/abs/10.1096/fasebj.2018.32.1_supplement.lb122	Full text unavailable

Bifidobacterium longum 1714 reduces stress-induced changes in anxiety and salivary cortisol and alters neurocognitive performance and resting EEG in healthy volunteers	Allen 2016	https://journals.lww.com/psychosomaticmedicine/citation/2016/04000/abstracts_of_the_74th_annual_meeting_of_the.16.aspx	Abstract/P osters
Bifidobacterium bifidum R0071 decreases stress-associated diarrhoea-related symptoms and self-reported stress: A secondary analysis of a randomised trial	Culpepper 2016	https://brill.com/view/journals/bm/7/3/article-p327_3.xml	data not available
Randomized, placebo-controlled trial of Lactobacillus rhamnosus GG as treatment of atopic dermatitis in infancy	Gruber 2007	https://onlinelibrary.wiley.com/doi/10.1111/j.1398-9995.2007.01543.x	Wrong outcomes
Influence of continuous ingestion of lactobacillus pentosus strain B240 on saliva components and properties in healthy adults- A randomized, double-blind, placebo-controlled study	Shimizu 2018	https://jglobal.jst.go.jp/en/detail?JGLOBAL_ID=201802266753123951	Full text unavailable
Intake of MPRO3 over 4 Weeks Reduces Glucose Levels and Improves Gastrointestinal Health and Metabolism	Lee 2022	https://www.mdpi.com/2076-2607/10/1/88	Wrong interventio n
Psychobiotic Supplementation of PS128, Improves Stress, Anxiety, and Insomnia in Highly Stressed Information Technology Specialists: A Pilot Study	Wu 2021	https://www.frontiersin.org/journals/nutrition/articles/10.3389/fnut.2021.614105/full	Wrong study design/non - randomize d
Effect of Probiotic Therapy on Neuropsychiatric Manifestations in Children with Multiple Neurotransmitter Disorders: A Study	Matis 2023	https://www.mdpi.com/2227-9059/11/10/2643	Wrong study design/non - randomize d

Is the gut microbiota bacterial abundance and composition associated with intestinal epithelial injury, systemic inflammatory profile, and C gastrointestinal symptoms in response to exertional-heat stress?	Bennett 2020	https://linkinghub.elsevier.com/retrieve/pii/S1440244020306629	Wrong study design/non-randomized
Gut microbiome patterns depending on children's psychosocial stress: Reports versus biomarkers	Michels 2019	https://www.sciencedirect.com/science/article/abs/pii/S0889159118312145?via%3Dihub	Wrong study design/non-randomized
The effectiveness of a Lactobacillus probiotic on measures of psychosocial health in adults diagnosed with subthreshold depression: a double-blind, randomised, placebo-controlled trial	Moschonis 2024	https://www.cambridge.org/core/journals/proceedings-of-the-nutrition-society/article/effectiveness-of-a-lactobacillus-probiotic-on-measures-of-psychosocial-health-in-adults-diagnosed-with-subthreshold-depression-a-doubleblind-randomised-placebocontrolled-trial/AD884D1A0315BA9536FF967A7884415B	Full text unavailable
A Preliminary Study on Effect of Lactobacillus paracasei HII01 on Cortisol in Fatigue Subjects	Lalitsuradej 2019	https://ieeexplore.ieee.org/document/8955402/	Wrong study design/non-randomized
Psychobiotic Effects on Anxiety Are Modulated by Lifestyle Behaviors: A Randomized Placebo-Controlled Trial on Healthy Adults.	Morales-Torres 2023	https://www.mdpi.com/2072-6643/15/7/1706	Wrong outcomes
A randomized trial of probiotic supplementation in nurses to reduce stress and viral illness.	Slykerman 2022	https://www.nature.com/articles/s41598-022-19104-9	Wrong outcomes

The efficacy of probiotics and/or n-3 long-chain polyunsaturated fatty acids intervention on maternal prenatal and postnatal depressive and anxiety symptoms among overweight and obese women.	Hulkkonen 2021	https://www.sciencedirect.com/science/article/pii/S016503272100330X?via%3Dihub	Wrong outcomes
Metabolic Status Influences Probiotic Efficacy for Depression-PRO-DEMET Randomized Clinical Trial Results.	Gawlik-Kotelnicka 2024	https://www.mdpi.com/2072-6643/16/9/1389	Wrong outcomes

Table S4: Study characteristics of the included studies



Separate excel file attached with the supplementary

Table S5: Meta regression using covariates

Mixed-Effects Model (k = 44; tau^2 estimator: ML)							
tau^2 (estimated amount of residual heterogeneity): 1.2497 (SE = 0.28)							
tau (square root of estimated tau^2 value): 1.1179							
I^2 (residual heterogeneity / unaccounted variability): 95.36%							
H^2 (unaccounted variability / sampling variability): 21.55							
R^2 (amount of heterogeneity accounted for): 18.42%							
Test for Residual Heterogeneity: QE(df = 39) = 571.1808, p-val <.0001							
Test of Moderators (coefficients 2:5): F(df1 = 4, df2 = 39) = 2.0412, p-val = 0.1075							
Model Results:							
	estimate	se	tval	df	pval	ci.lb	ci.ub
intrcpt	0.061	0.5199	0.1174	39	0.9072	-0.9906	1.1127
trt_dur_wk	0.0604	0.0401	1.5049	39	0.1404	-0.0208	0.1415
Strains	-0.0532	0.0638	-0.8335	39	0.4096	-0.1823	0.0759
Overall_Sex_M	-0.0216	0.0086	-2.5152	39	0.0161	-0.0389	-0.0042*
Overall_Sex_F	-0.0023	0.0054	-0.4202	39	0.6766	-0.0131	0.0086

Signif. codes:	0 '***'	0.001 ' **'	0.01 ' *'	0.05 ' .'	0.1 ' ' 1		

Table S6. Grade of evidence# in complete case analysis and after outlier removal

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Probiotics	Control	Relative (95% CI)	Absolute (95% CI)		
Cortisol - Complete case analysis												
46	Randomised trials	Serious	Serious	Not serious	Not serious	None	1771	1745	-	SMD - 0.45 (-0.83 to -0.07)	 Low	High heterogeneity and risk of bias
Cortisol - after outlier removal												
38	Randomised trials	Serious	Not serious	Not serious	Not serious	None	1385	1357	-	SMD - 0.18 (-0.28 to -0.08)	 Moderate	

CI: confidence interval; SMD: standardised mean difference; #GRADEpro GDT: GRADEpro Guideline Development Tool [Software]. McMaster University and Evidence Prime, 2024

Figure S1: Forest plot showing subgroup analysis based on number of strains

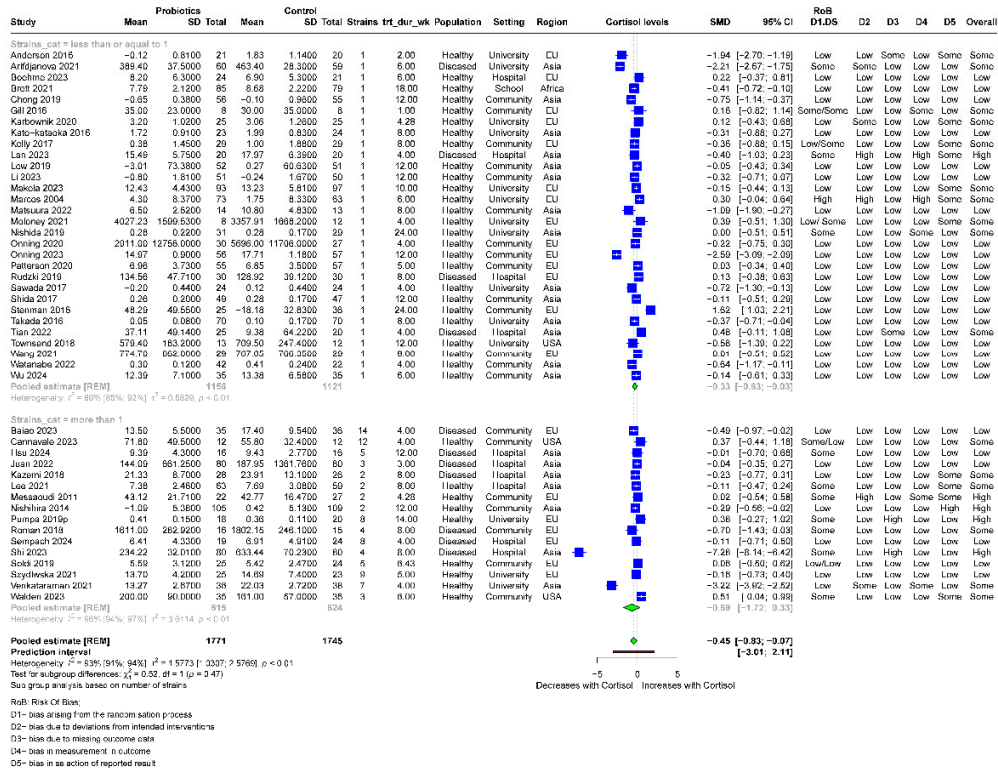


Figure S2: Forest plot showing subgroup analysis based on treatment duration

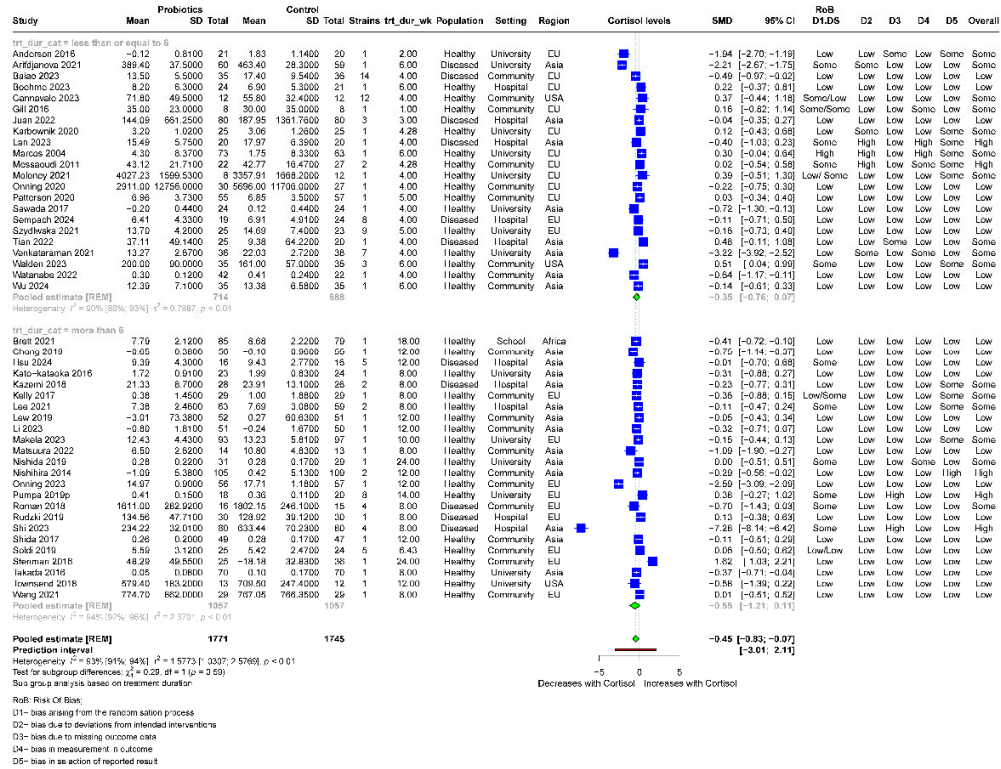


Figure S3: Forest plot showing subgroup analysis based on study population

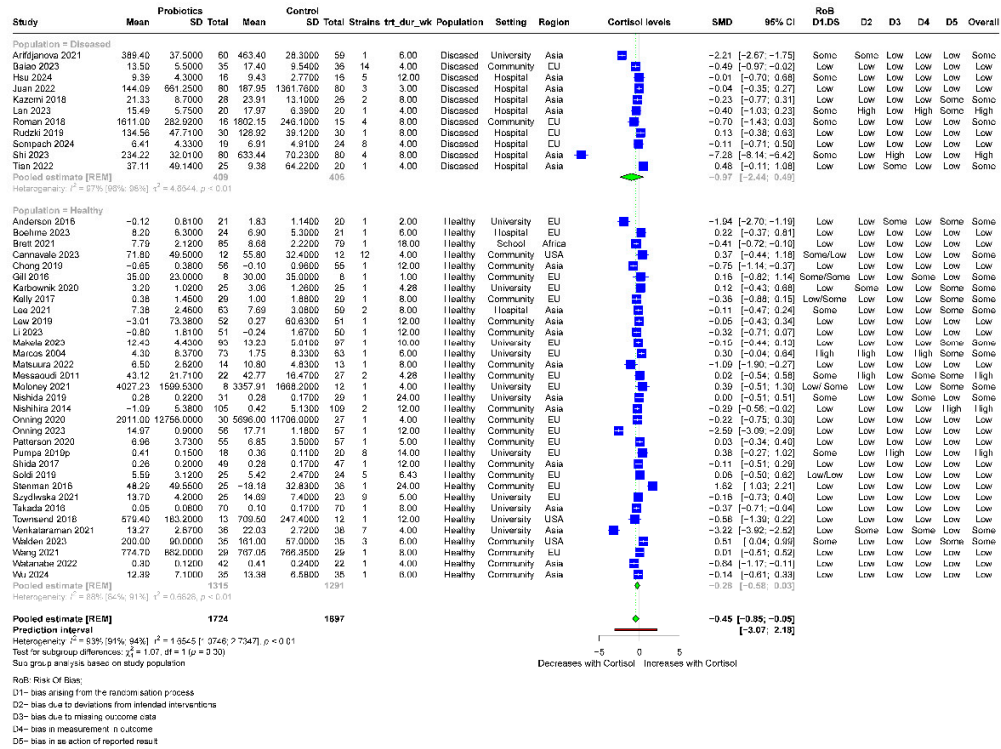


Figure S4: Forest plot showing subgroup analysis based on use of concomitant medications

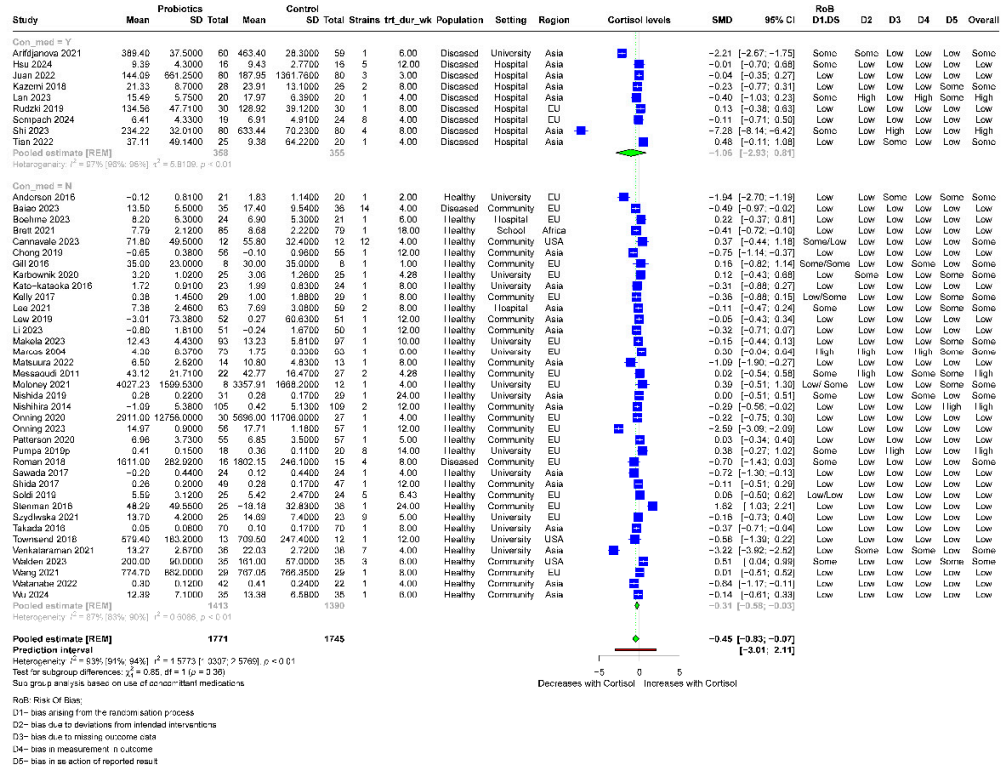


Figure S5 Forest plot showing subgroup analysis based on region

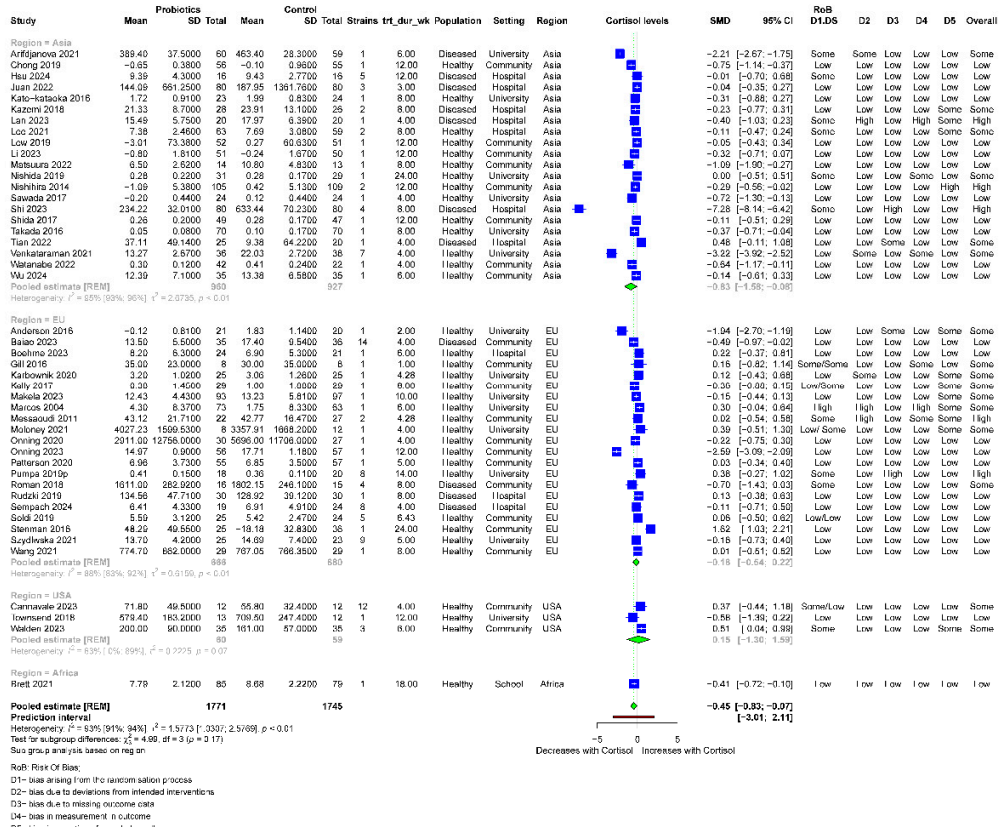


Figure S6: Forest plot showing subgroup analysis based on RoB

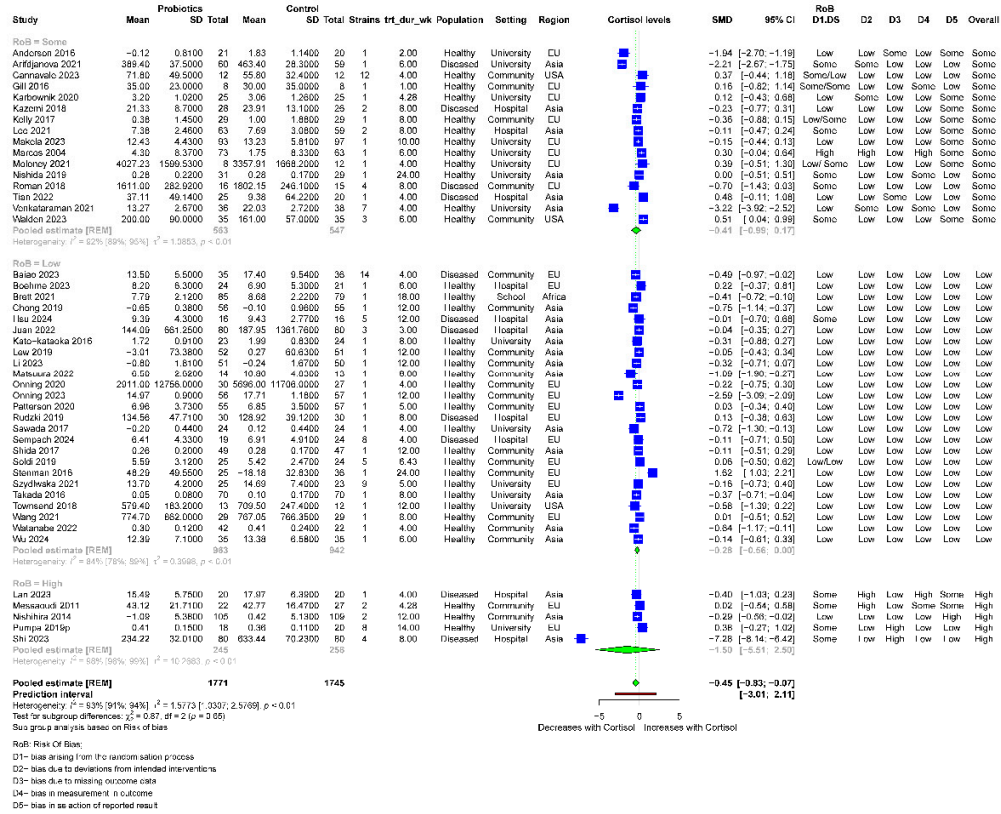


Figure S7: Forest plot showing leave-one-out analysis

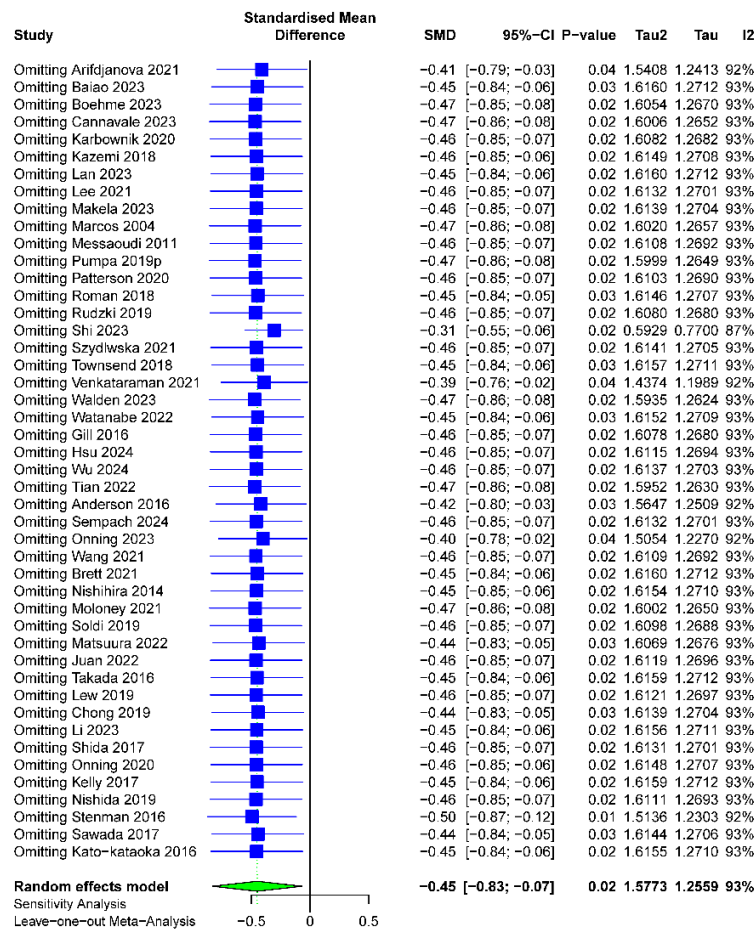
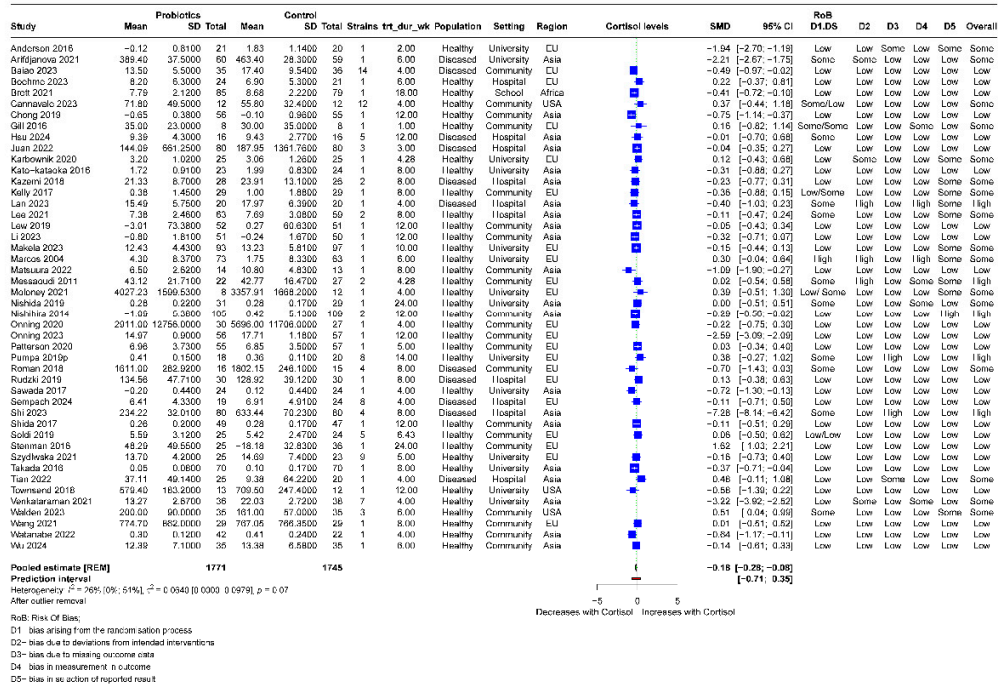


Figure S8: Forest plot showing pooled estimates after outliers' removal



Study	Low risk of bias (%)	Some concerns (%)	High risk of bias (%)
D1 DS	70	25	5
D2	85	10	5
D3	90	5	5
D4	85	10	5
D5	75	20	5

Figure S10: Funnel plot after outlier removal

