

An update on the gut-brain axis research in psychiatry

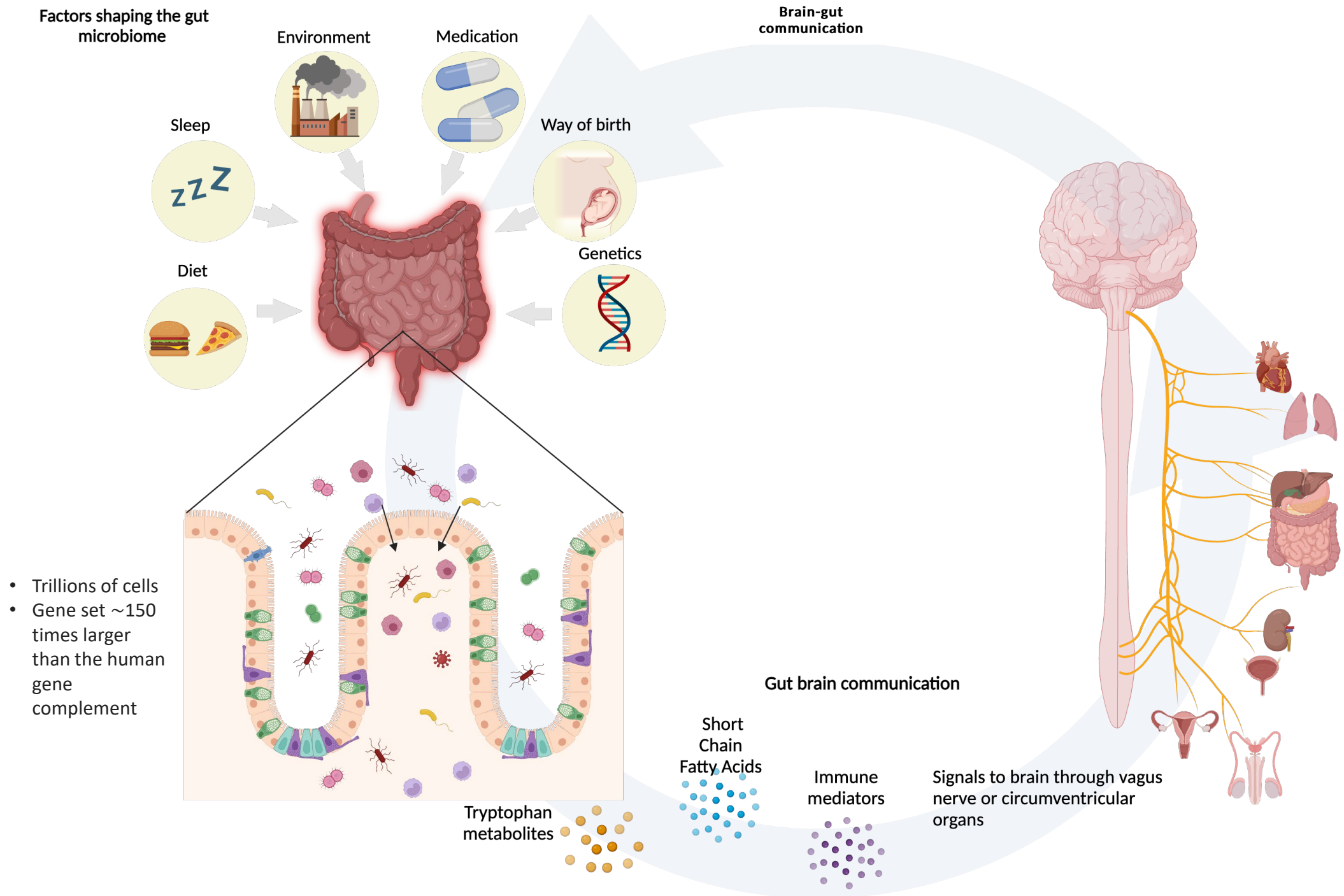
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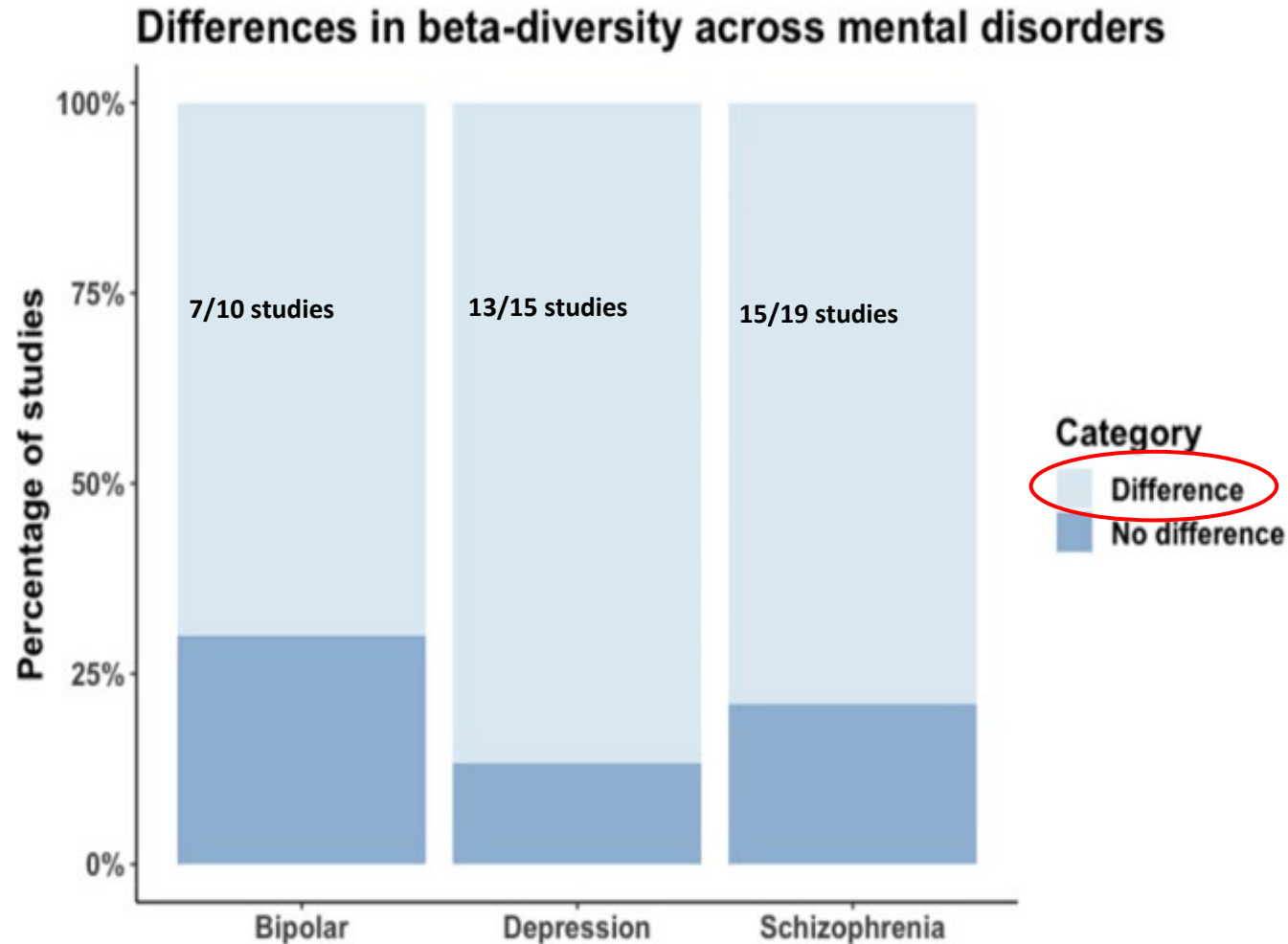


Financial disclosures

I have nothing to disclose.



Imbalanced gut microbiota in patients (1)

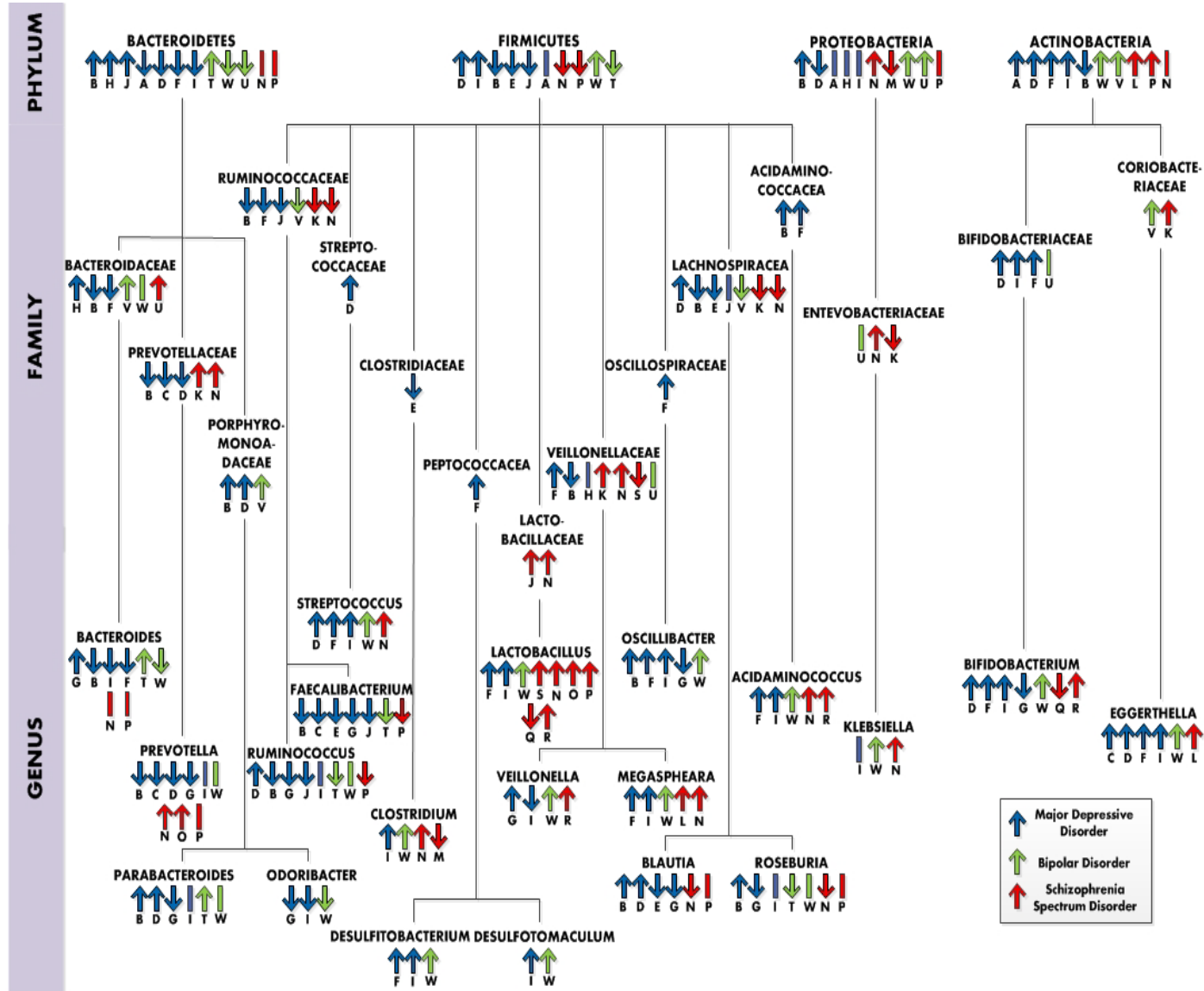


n=103 Dutch patients with BD/SSD
n=128 healthy controls

McGuinness et al, Molecular Psychiatry, 2022

Ioannou et al, Brain, Behaviour, and Immunity, 2024

Imbalanced gut microbiota in patients (2)

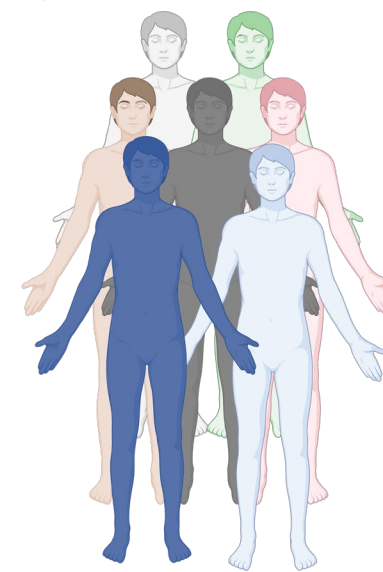


Imbalanced gut microbiota in patients (3)

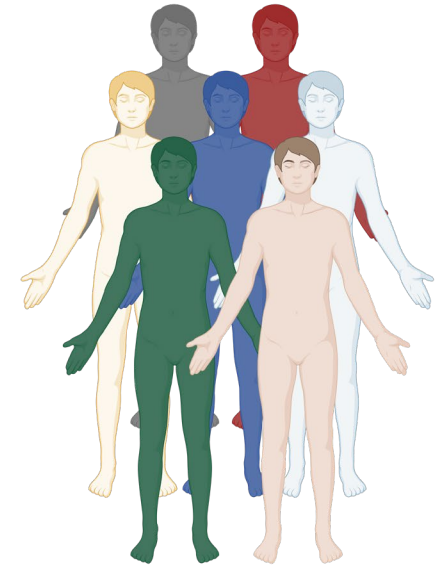
Increased/decreased levels of twenty-six bacteria in patients

| Differentially abundant taxa per taxonomic level | | Estimate | Error | P _{FDR} | Enrichment |
|---|--|----------|-------|------------------|------------|
| Phylum | | | | | |
| Actinobacteria | | 1.18 | 0.22 | 0.000003 | BD/SSD |
| Class | | | | | |
| Coriobacteriia | | 0.92 | 0.21 | 0.0002 | BD/SSD |
| Order | | | | | |
| Eggerthellales | | 0.96 | 0.20 | 0.000003 | BD/SSD |
| Coriobacteriales | | 0.85 | 0.29 | 0.008 | BD/SSD |
| Veillonellales | | 1.09 | 0.44 | 0.2 | BD/SSD |
| Bifidobacteriales | | 0.97 | 0.34 | 0.04 | BD/SSD |
| Clostridia order incertae sedis | | -0.96 | 0.37 | 0.04 | HC |
| Family | | | | | |
| <i>Eggerthellaceae</i> | | 0.87 | 0.21 | 0.001 | BD/SSD |
| <i>Coriobacteriaceae</i> | | 0.78 | 0.29 | 0.02 | BD/SSD |
| <i>Ruminococcaceae</i> | | 0.42 | 0.16 | 0.03 | BD/SSD |
| <i>Veillonellaceae</i> | | 1.08 | 0.44 | 0.03 | BD/SSD |
| <i>Bifidobacteriaceae</i> | | 0.96 | 0.34 | 0.04 | BD/SSD |
| <i>Odoribacteraceae</i> | | -0.91 | 0.24 | 0.007 | HC |
| <i>Clostridia fam. incertae sedis</i> | | -0.96 | 0.38 | 0.04 | HC |
| Genus | | | | | |
| <i>Eggerthella</i> | | 0.91 | 0.21 | 0.001 | BD/SSD |
| <i>Collinsella</i> | | 0.71 | 0.31 | 0.03 | BD/SSD |
| <i>Eggerthellaceae gen. incertae sedis</i> | | 0.75 | 0.22 | 0.02 | BD/SSD |
| <i>Ruthenibacterium</i> | | 0.72 | 0.22 | 0.03 | BD/SSD |
| <i>Lachnoclostridium</i> | | 0.79 | 0.23 | 0.03 | BD/SSD |
| <i>Odoribacter</i> | | -0.98 | 0.36 | 0.002 | HC |
| Species | | | | | |
| <i>Butyricicoccus species incertae sedis [meta_mOTU_v3_12336]</i> | | 0.89 | 0.23 | 0.009 | BD/SSD |
| <i>Ruminococcaceae species incertae sedis [ext_mOTU_v3_17469]</i> | | 0.97 | 0.36 | 0.02 | BD/SSD |
| <i>Clostridiales species incertae sedis [ext_mOTU_v3_26501]</i> | | 0.54 | 0.15 | 0.01 | BD/SSD |
| <i>Odoribacter splanchnicus</i> | | -1.00 | 0.24 | 0.009 | HC |
| <i>Clostridiales species incertae sedis [meta_mOTU_v3_12254]</i> | | -1.93 | 0.54 | 0.02 | HC |
| <i>Firmicutes species incertae sedis [meta_mOTU_v3_12845]</i> | | -1.22 | 0.28 | 0.02 | HC |

Bipolar or Schizophrenia
Spectrum Disorder (n=103)



Healthy controls (n=128)



Matched on age, sex, BMI & transit time
Corrected for diet

Microbial signatures: Possible diagnostic value?

Trained model/Classifier

Balance 1

Numerator:

s_Ruminococcaceae species incertae sedis*, s_Rutheribacterium lactatiformans*,
f_Veillonellaceae*

Denominator:

f_Odoribacteraceae*, s_Odoribacter splanchnicus*, s_Prevotella copri*, s_Alistipes
putredinis, s_Clostridiales species incertae sedis*, c_Alphaproteobacteria,
o_Rhodospirillales, g_Akkermansia*

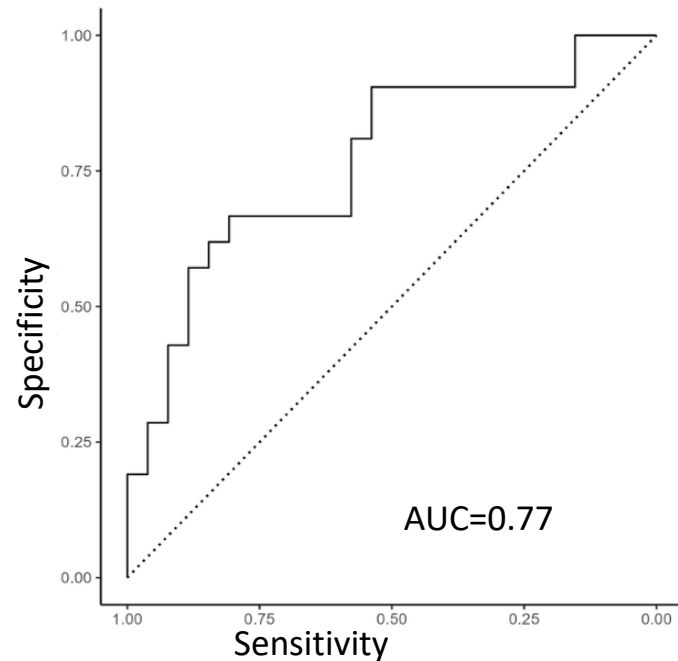
Balance 2

Numerator:

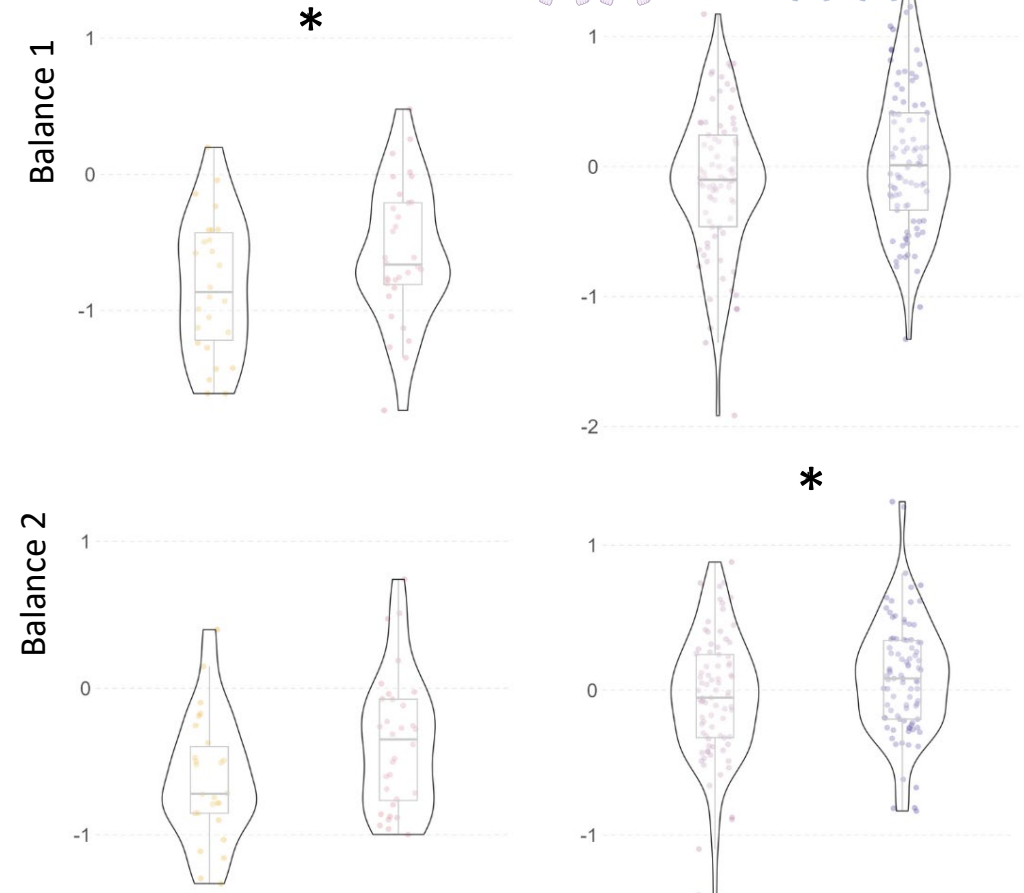
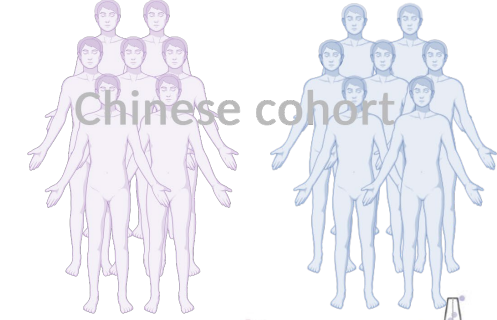
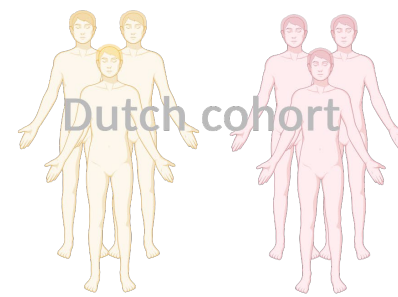
f_Eggerthellaceae*, g_Rikenellaceae gen. [Tidjanibacter/Alistipes], s_Clostridiales
species incertae sedis*, s_Faecalibacterium prausnitzii, s_Ruminococcaceae species
incertae sedis*, s_Ruthenibacterium lactatiformans*, f_Veillonellaceae*, g_Dialister

Denominator:

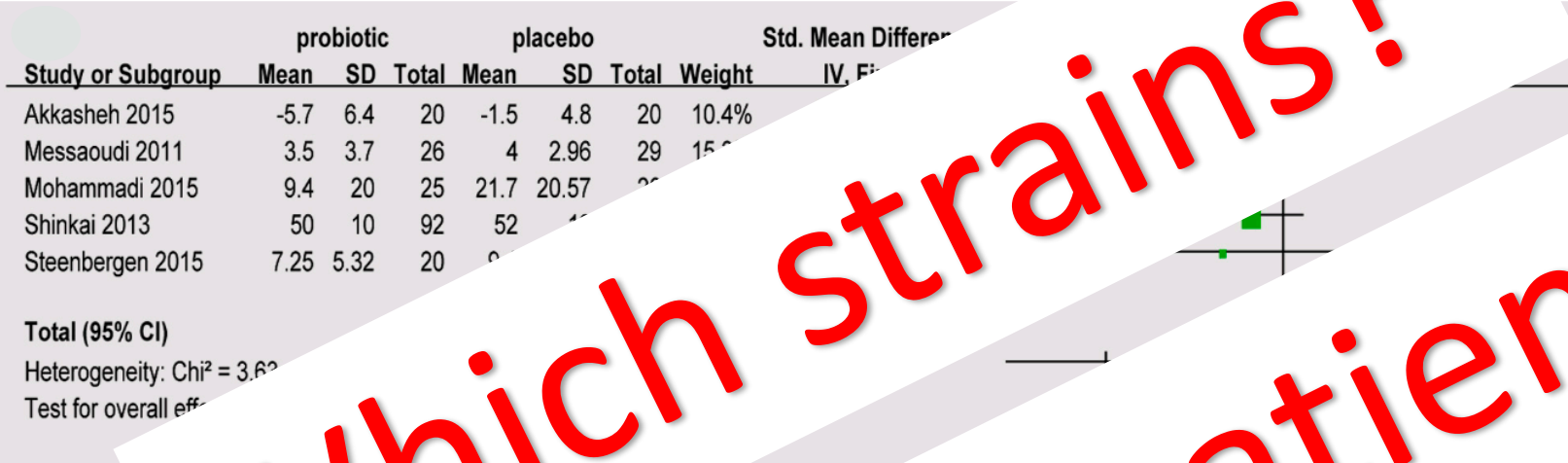
f_Odoribacteraceae*, s_Odoribacter splanchnicus*, s_Prevotella copri*,
s_Clostridiales species incertae sedis*, s_Clostridiales species incertae sedis*,
c_Alphaproteobacteria, o_Rhodospirillales, s_Sutterella wadsworthensis,
g_Akkermansia*



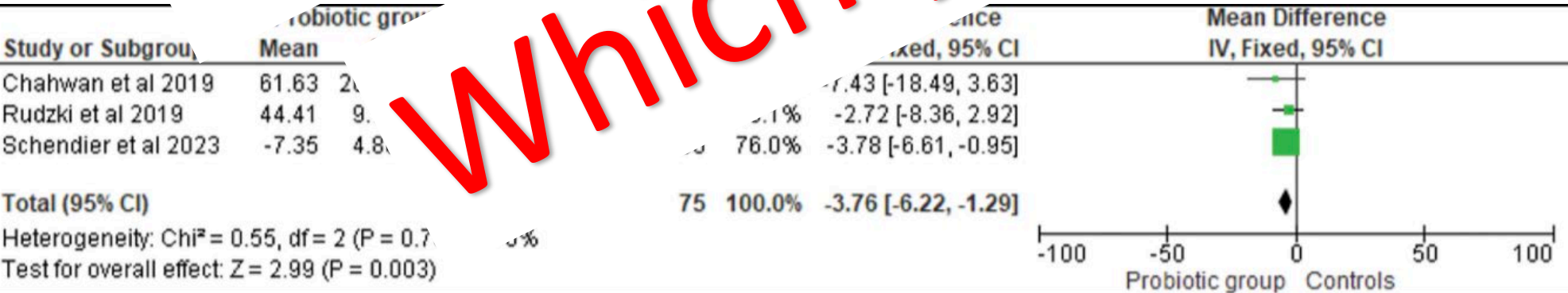
HC (n=26) BD/SSD(n=32) HC (n=81) Medication free schizophrenia (n=90)



Probiotics may mitigate depressive symptoms & enhance cognitive domains



Huang et al



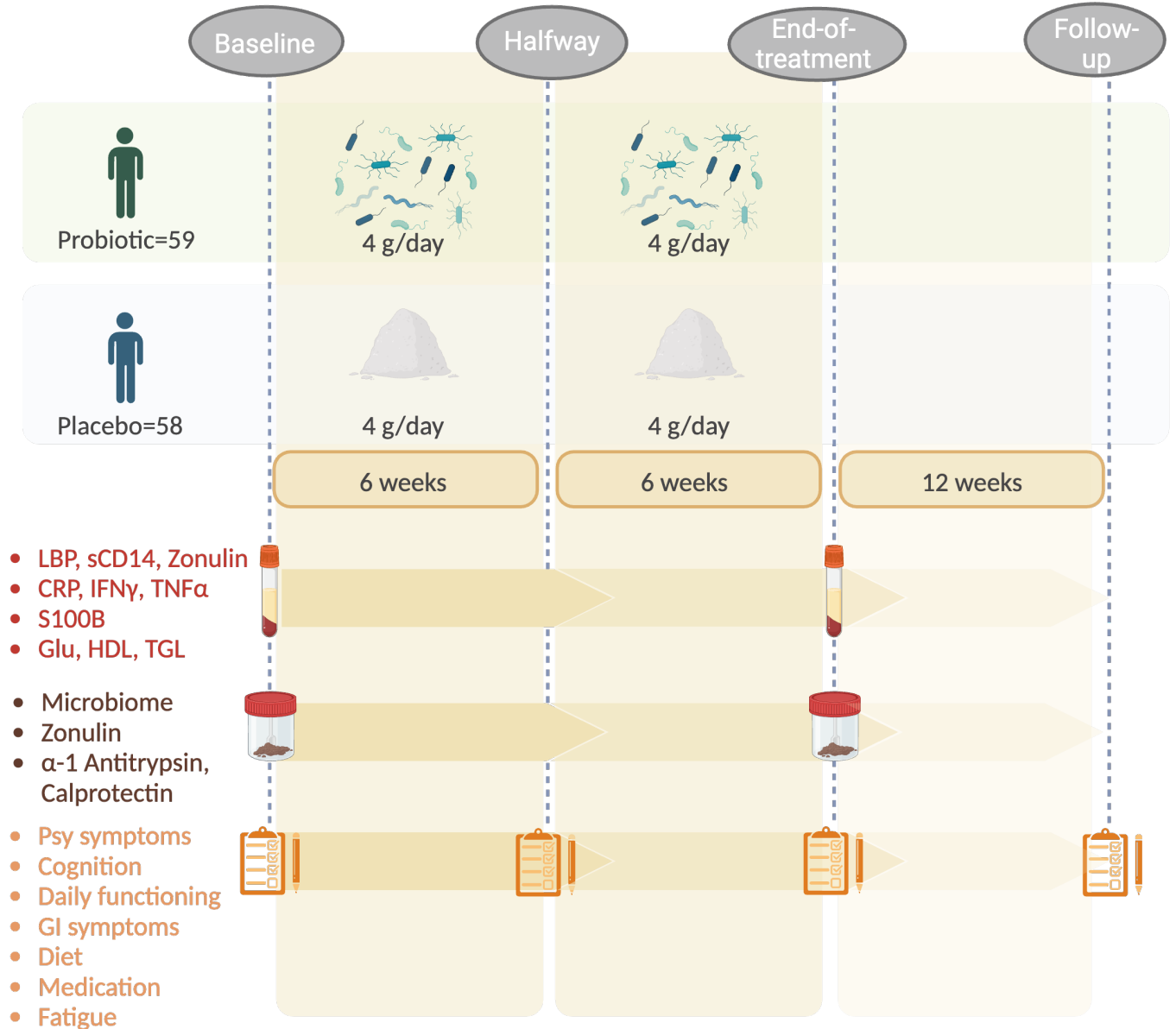
He et al, Medicine, 2023

GUTS study design

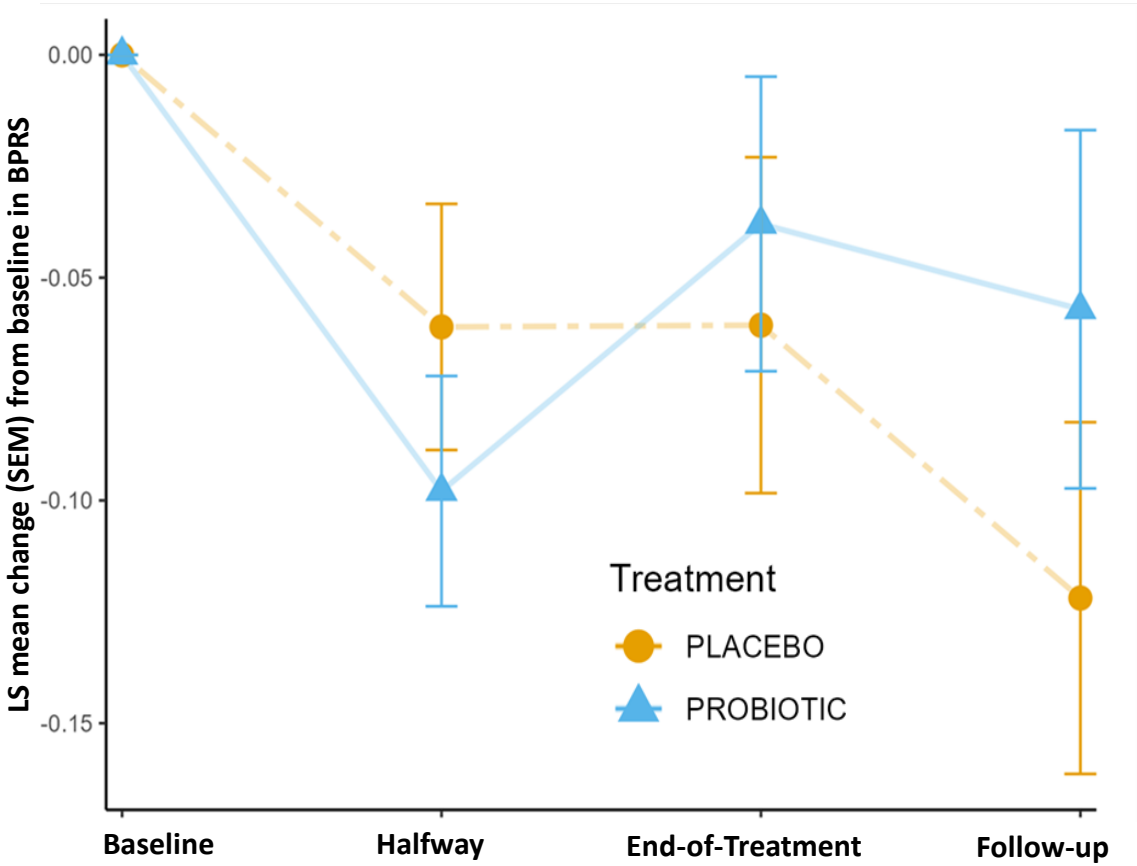
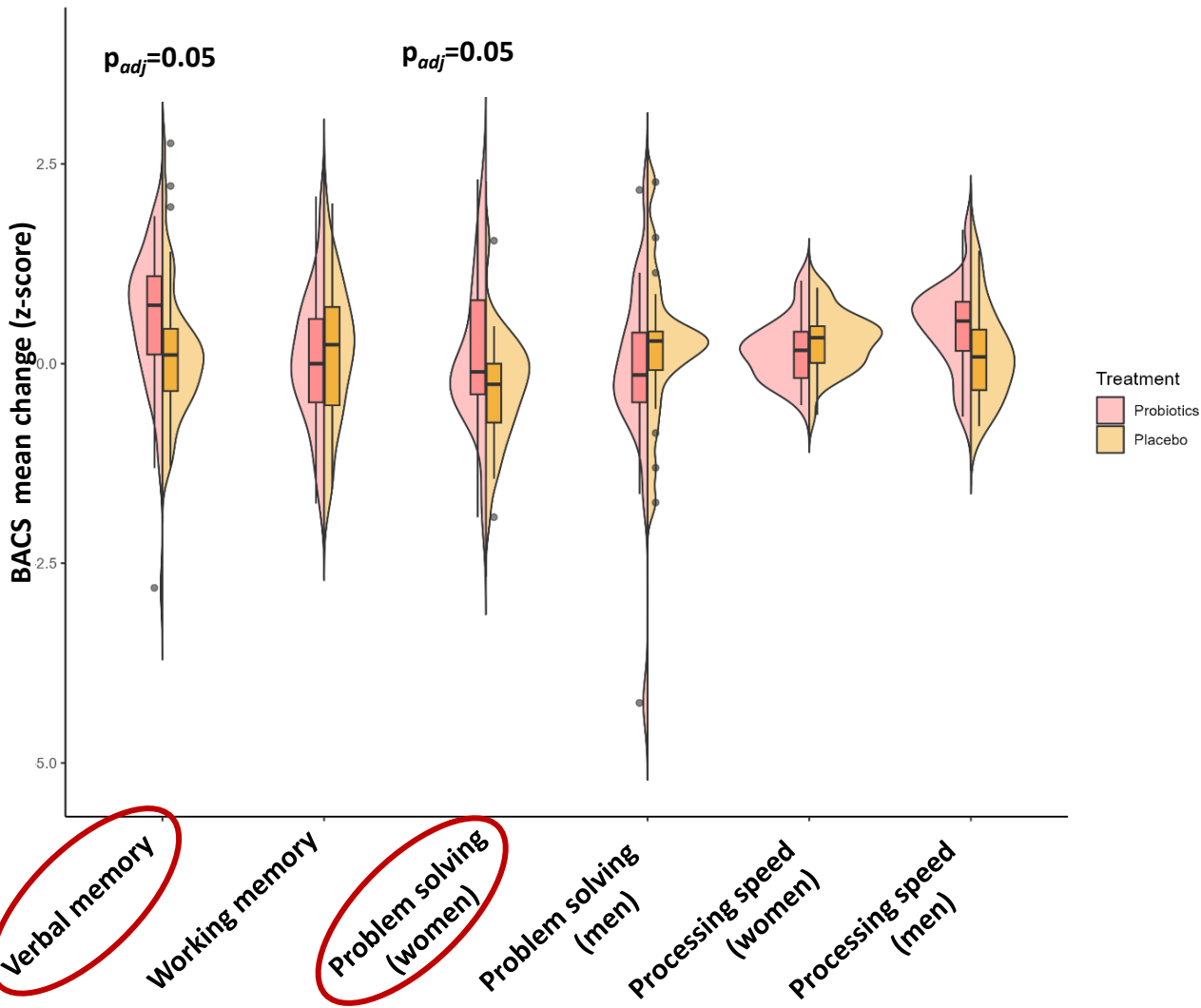
Ecologic® Barrier



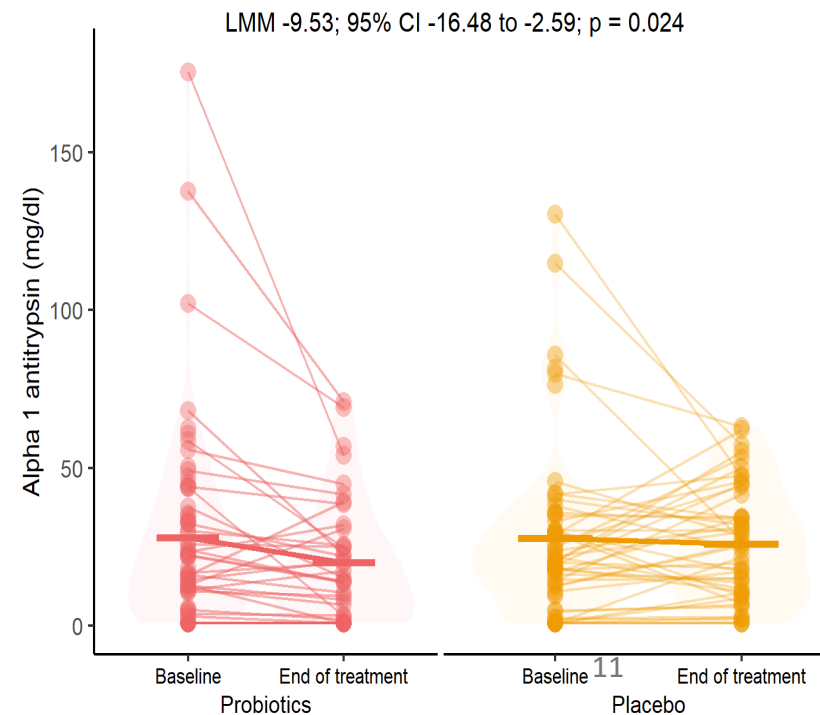
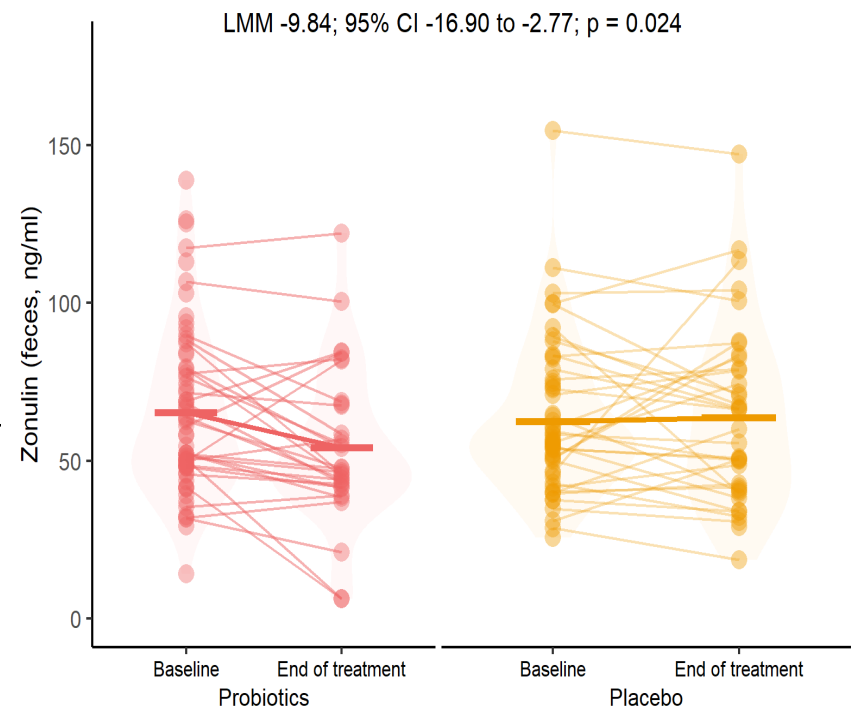
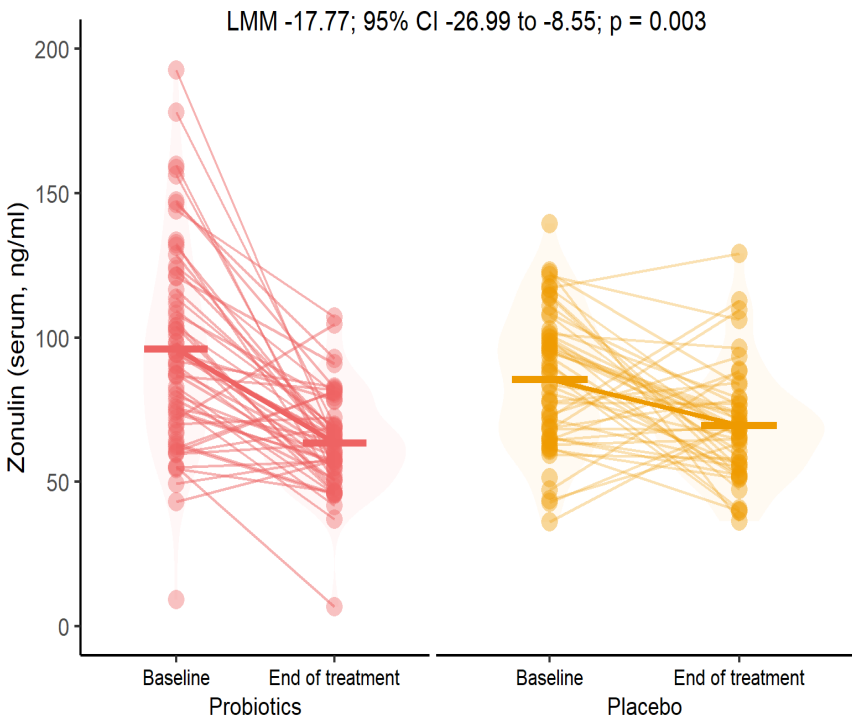
9 bacterial strains
 Bifidobacterium bifidum W23
 Bifidobacterium lactis W51
 Bifidobacterium lactis W52
 Lactobacillus acidophilus W37
 Lactobacillus brevis W63
 Lactobacillus casei W56
 Lactobacillus salivarius W24
 Lactococcus lactis W19
 Lactococcus lactis W58



Adjunctive probiotic treatment enhanced cognition but did not improve psychiatric symptoms

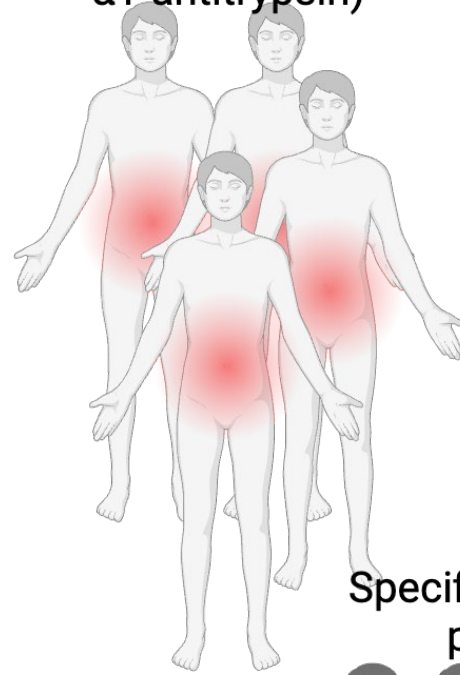


Adjunctive probiotic treatment improved proxies of gut barrier integrity

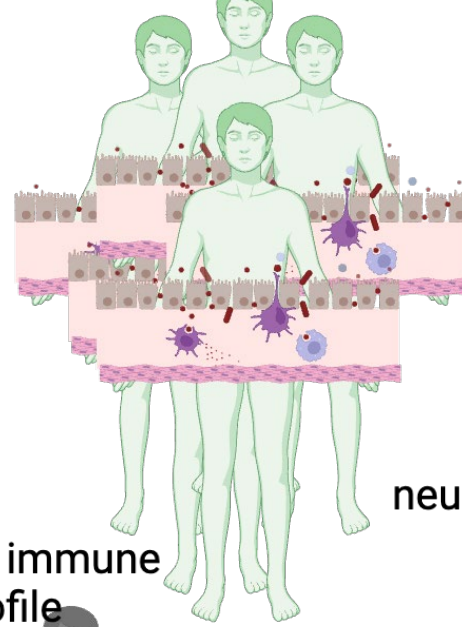


What's next?

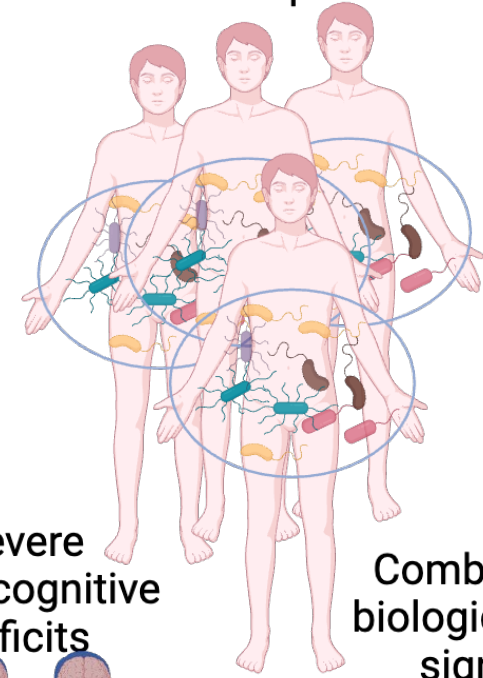
Gastrointestinal
inflammation (calprotectin,
 α 1-antitrypsin)



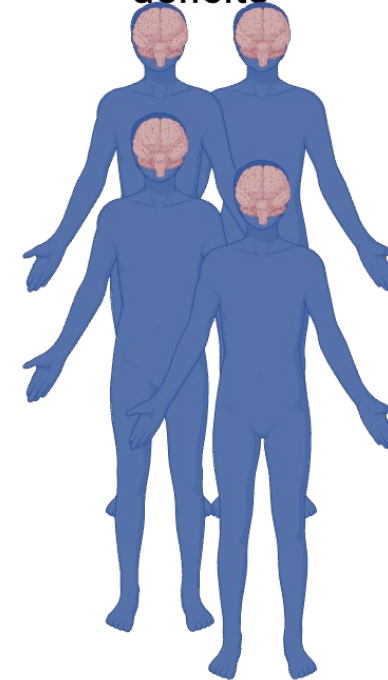
Increased intestinal
permeability
(Zonulin, LBP)



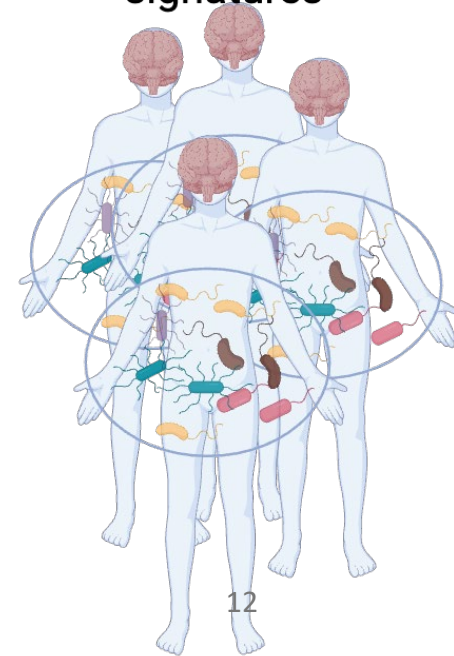
Specific
microbial profile



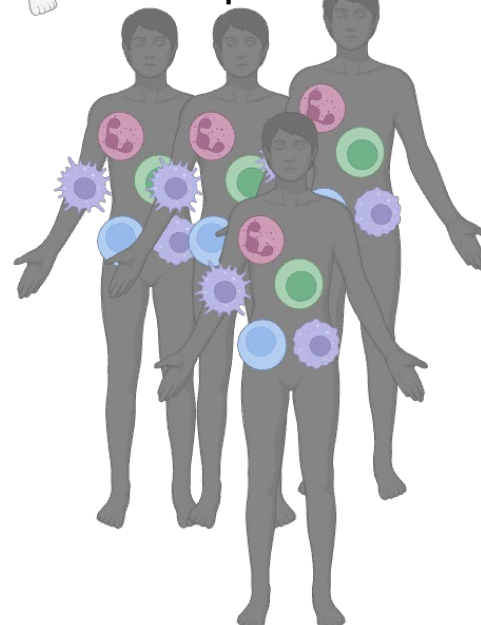
Severe
neurocognitive
deficits



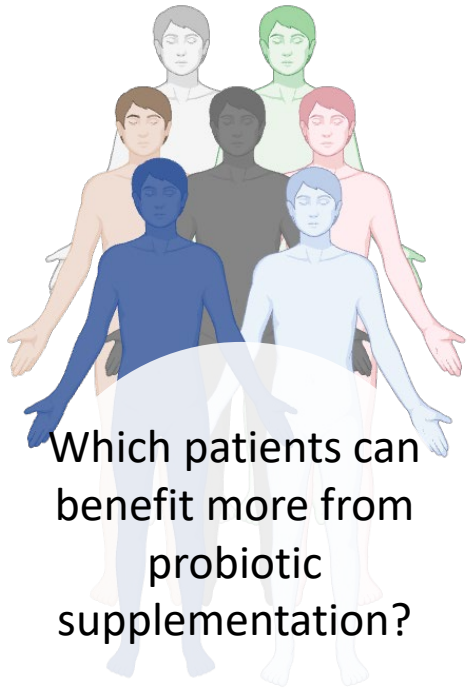
Combination of
biological/clinical
signatures



Specific immune
profile



Which patients can
benefit more from
probiotic
supplementation?



Discussion and take-home message

1. Alterations in gut microbiota composition in patients.
2. Probiotics are a promising adjunctive therapy.
3. Which strains and for which patients remains to be explored.

GUTS Team

PhD students

Jenny Borkent, MSc



Sergio Andreu Sanchez, MSc



Principal investigators

Dr. Benno Haarman



Prof. dr. Iris Sommer

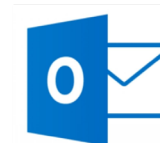


Prof. dr. Jingyuan Fu





Thank you for your attention!



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