



CAN ALTERING THE GUT MICROBIOME VIA DIET TREAT SYMPTOMS OF MAJOR DEPRESSIVE DISORDER?

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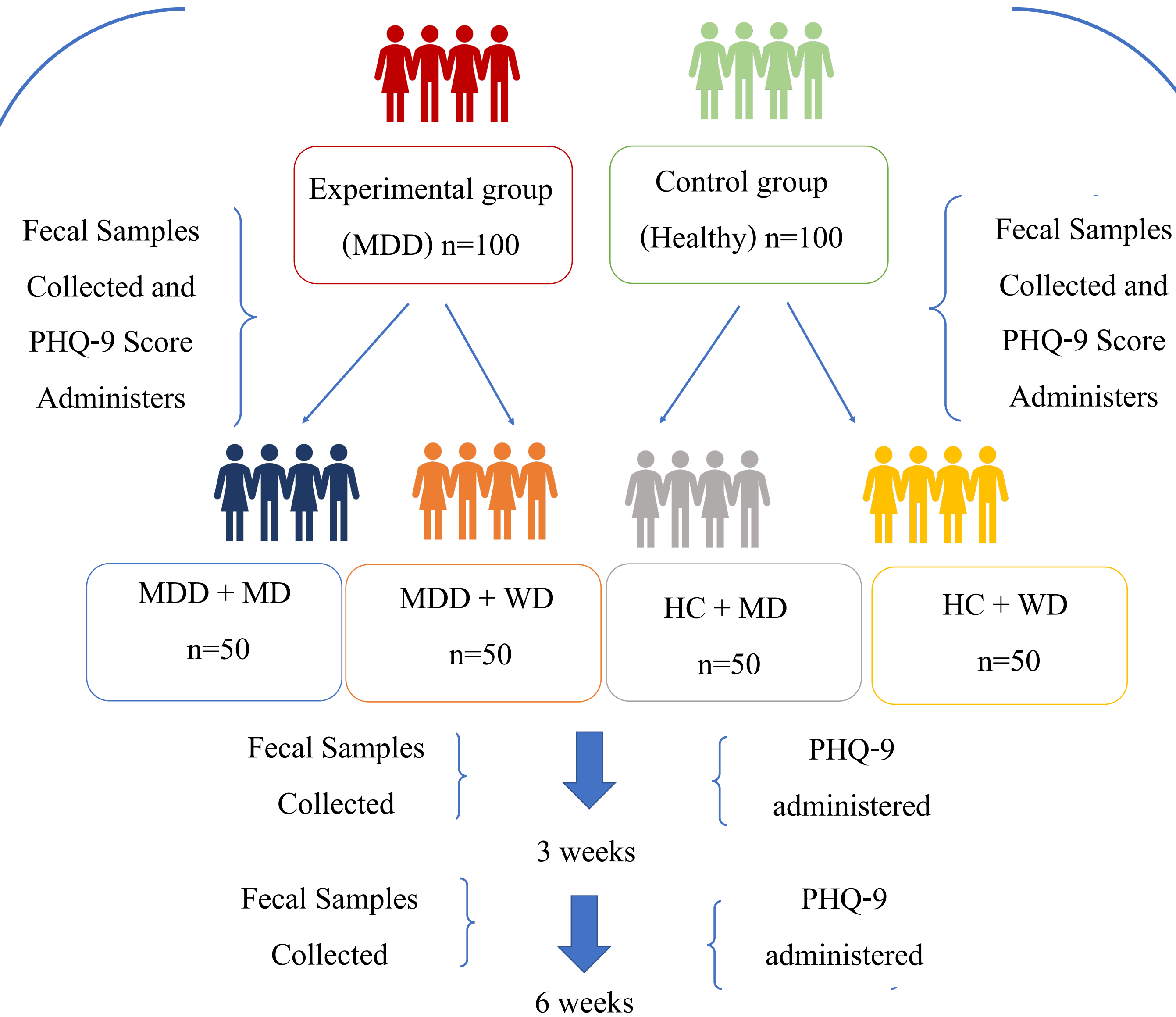


BACKGROUND

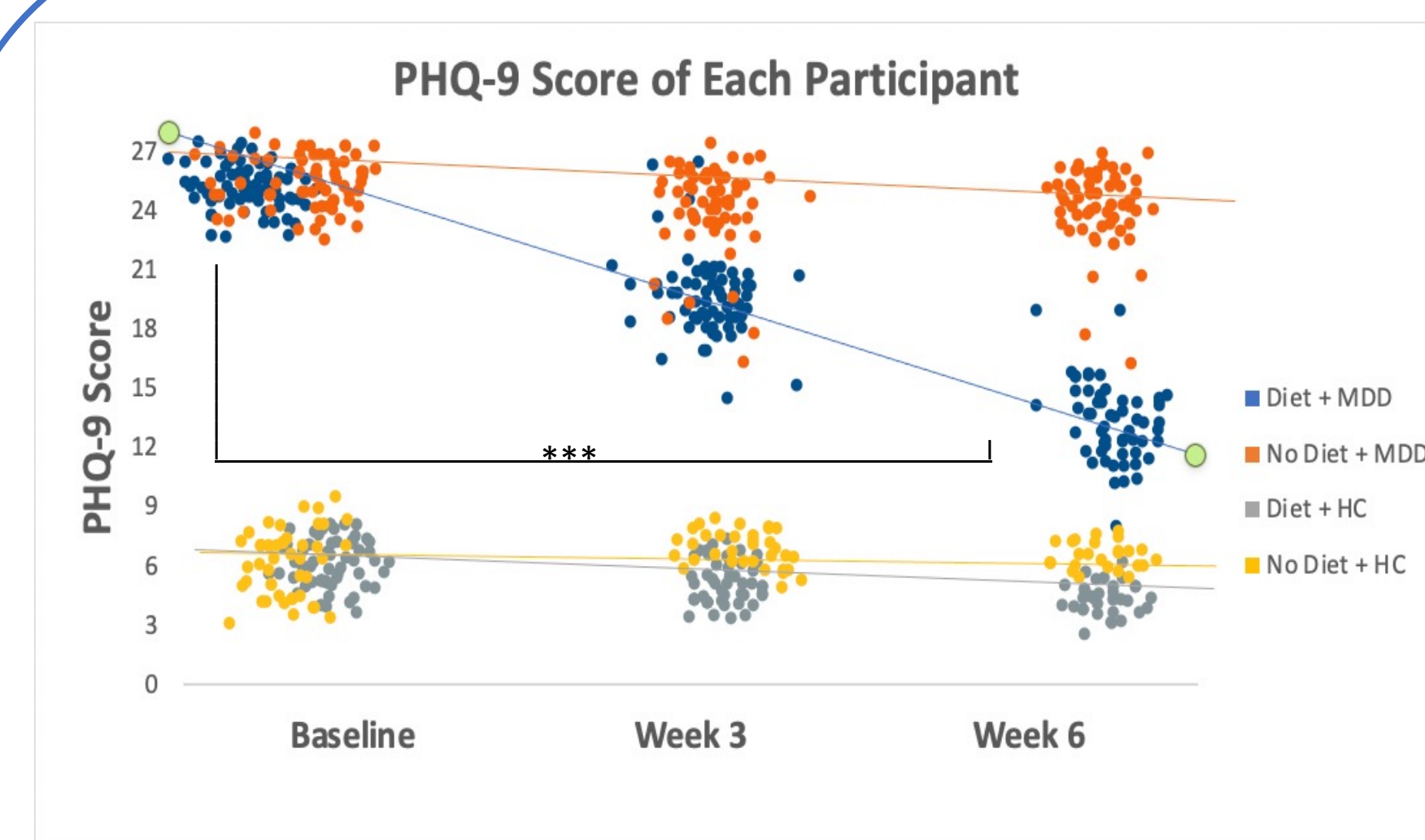
Problem: Worldwide, 350 million people suffer from Major Depressive Disorder (MDD), yet antidepressant medications do not work for 30 - 40 % of MDD patients.

Objective: Identify alternative ways to treat MDD using the gut-microbiome and Mediterranean diet (MD) and Western diet (WD). Based on previous research, if a bidirectional relationship exists between depression and the gut-microbiome, the abundance of gut bacteria will increase for Bacteroidetes, but decrease Firmicutes and Lactobacillus upon eating the MD or WD (Jiang et al., 2019).

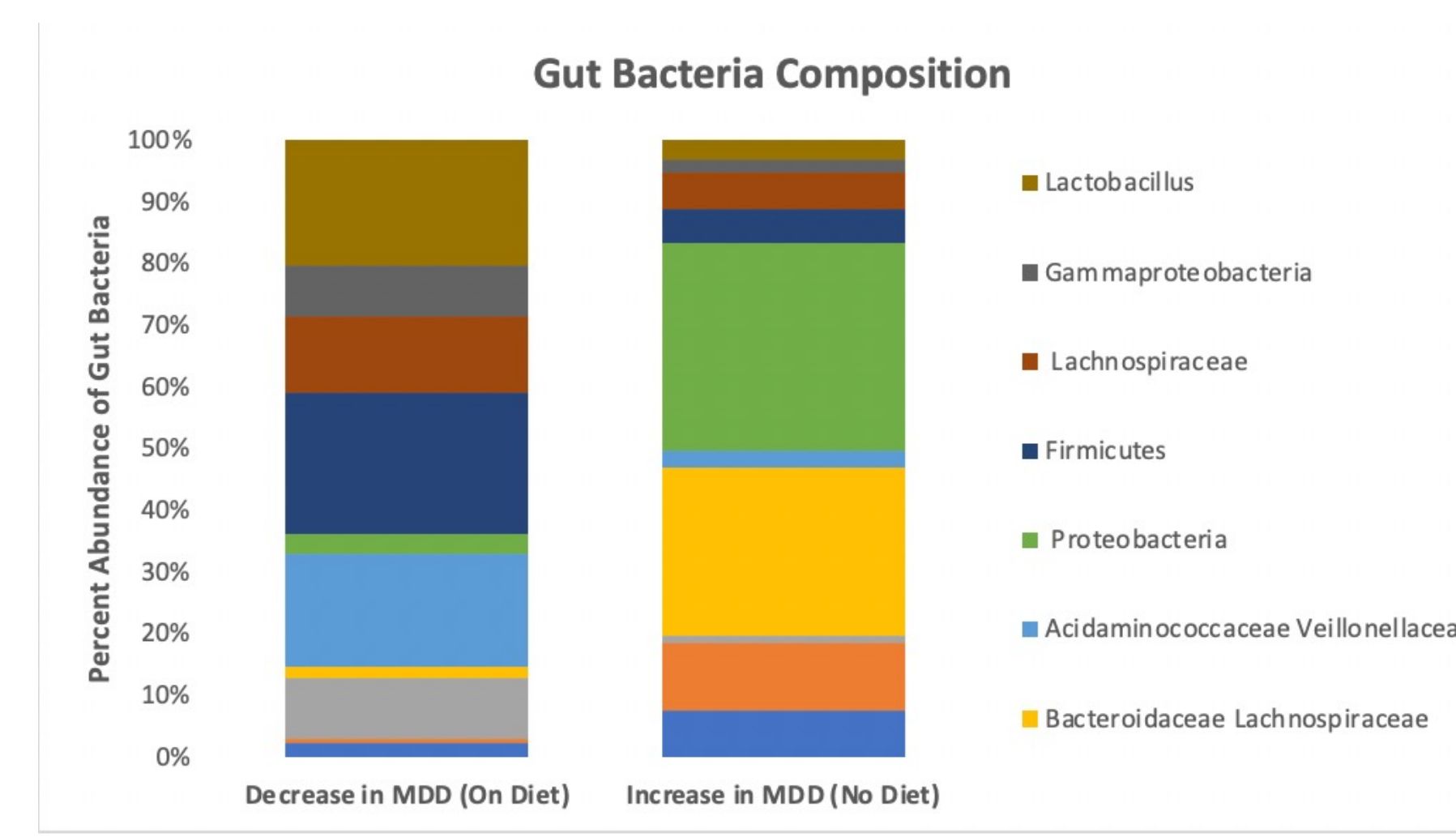
Based on the gut-brain axis, I expect to see a more diverse microbiome when eating a Mediterranean diet than a Western diet as it improves symptoms of MDD as measured in the PHQ-9 scale.



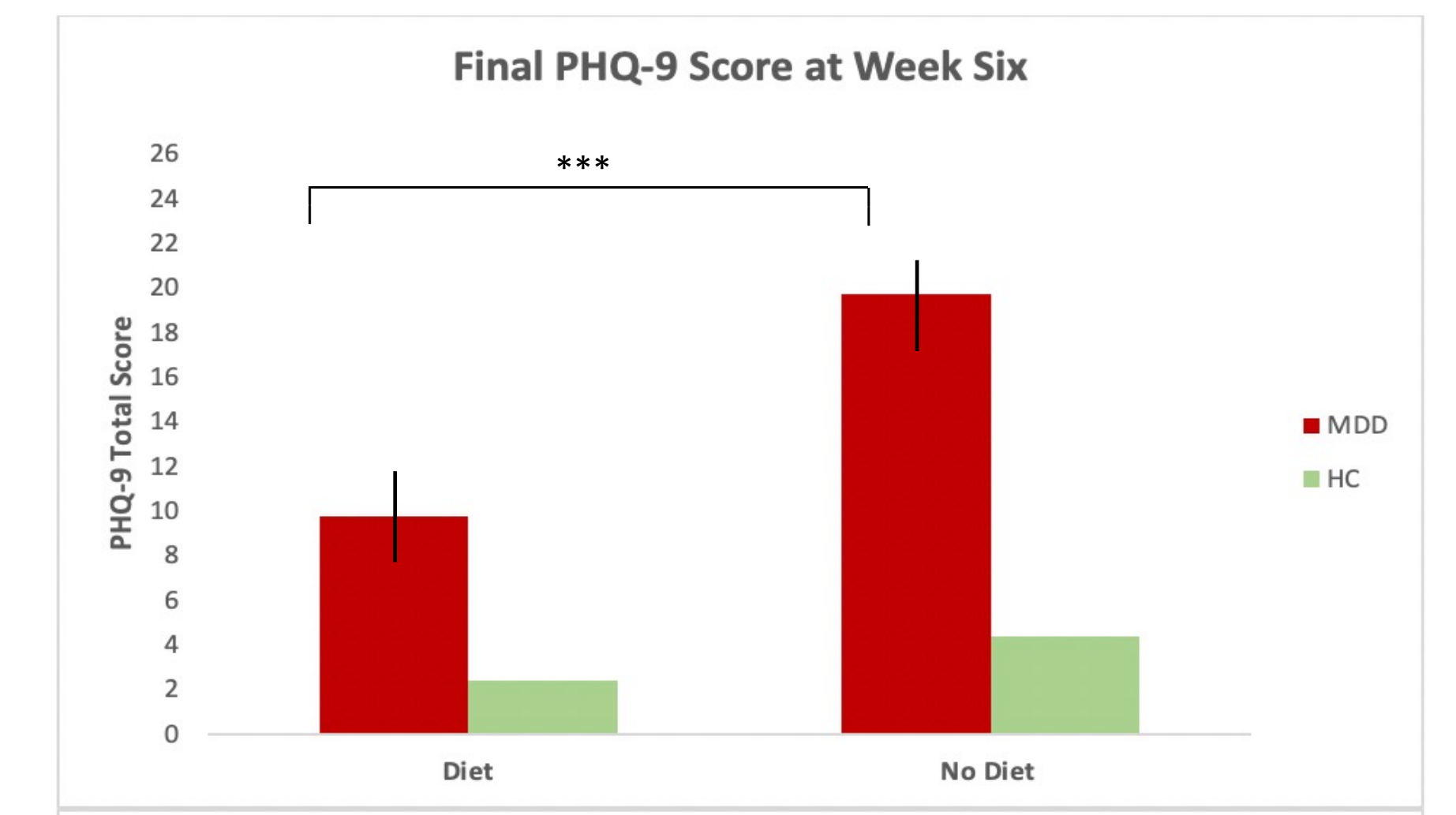
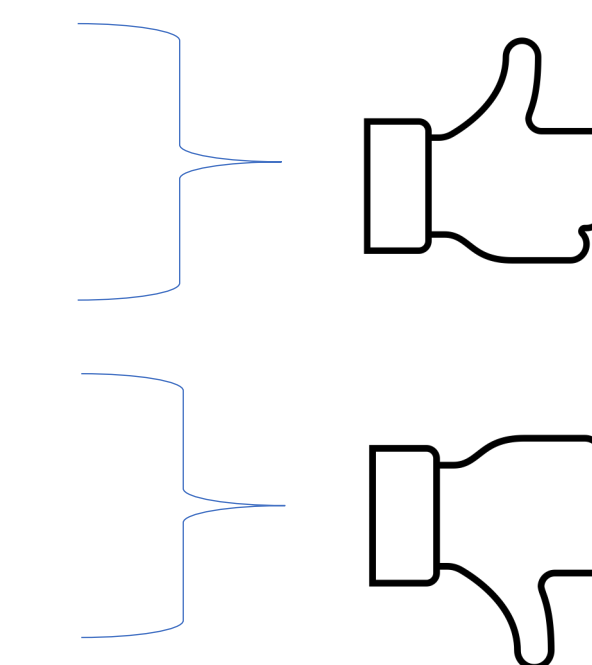
INFLUENCE OF GUT DIVERSITY AND DIET ON BEHAVIOR



MDD patients on a Mediterranean diet showed significant decline of depression improvements to the severity of their depression compared to the control group.



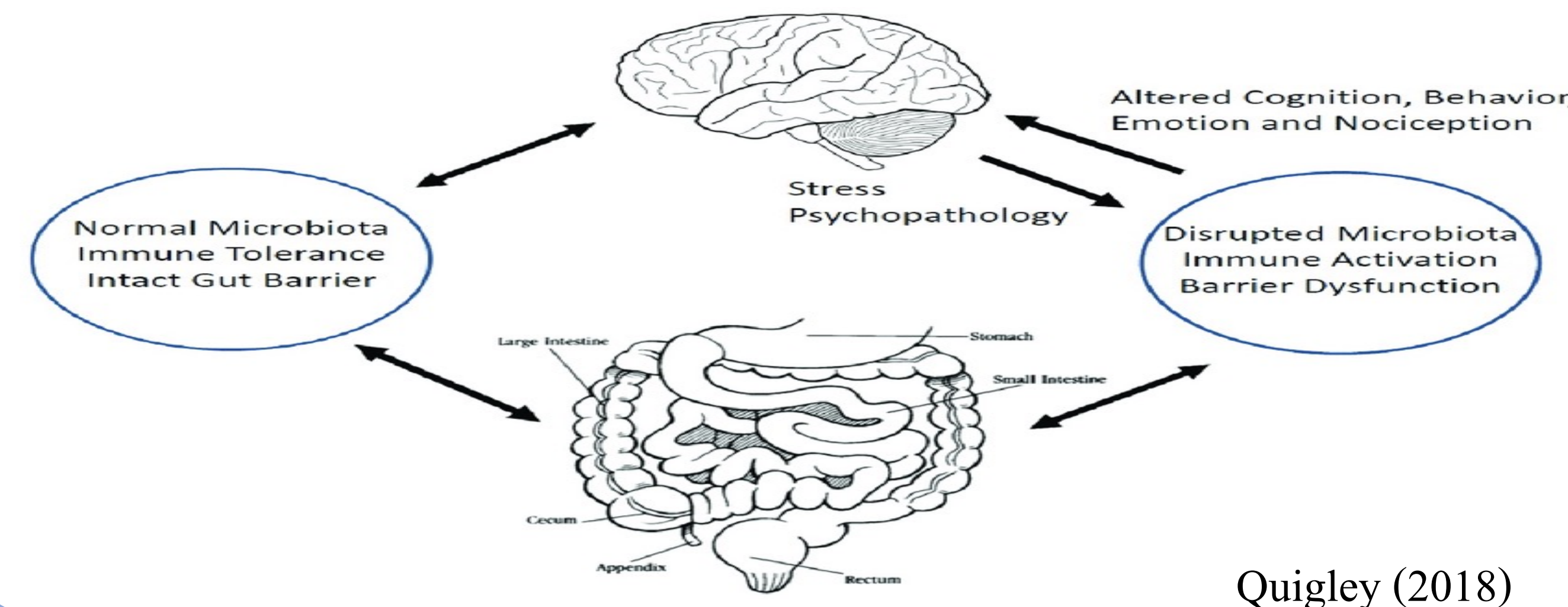
Bacteroidetes
Proteobacteria
Firmicutes
Lactobacillus



Mediterranean Diet > Western Diet

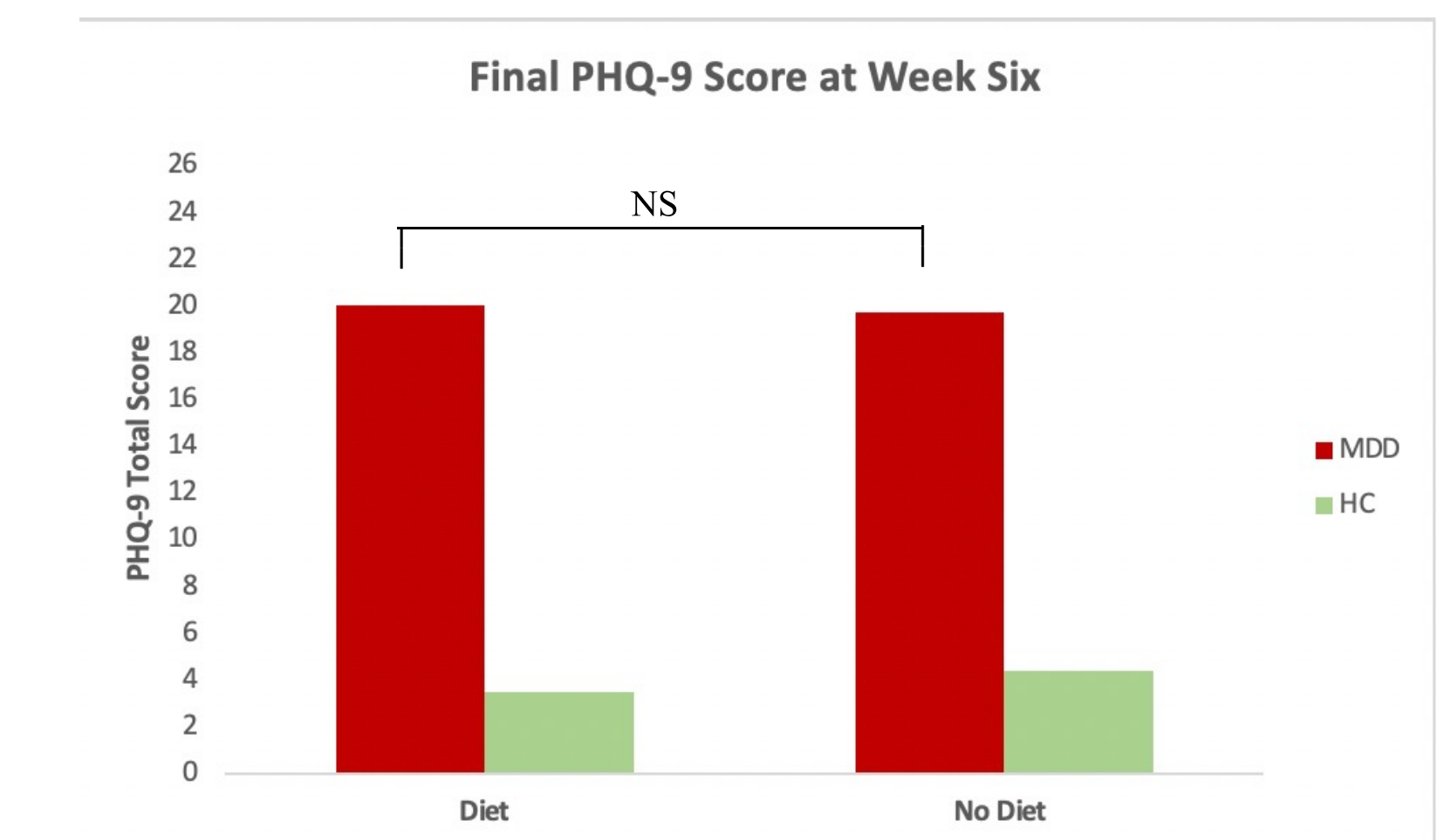
Diet alters the gut microbiome via the brain-gut axis and improves behavior compared to the healthy and non- diet control groups.

GUT-BRAIN AXIS

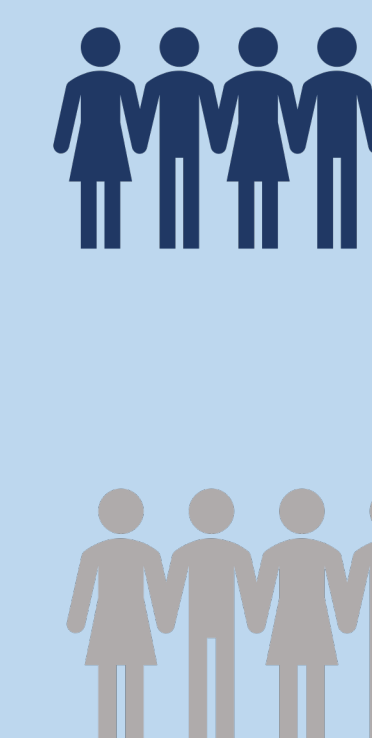


NULL HYPOTHESIS

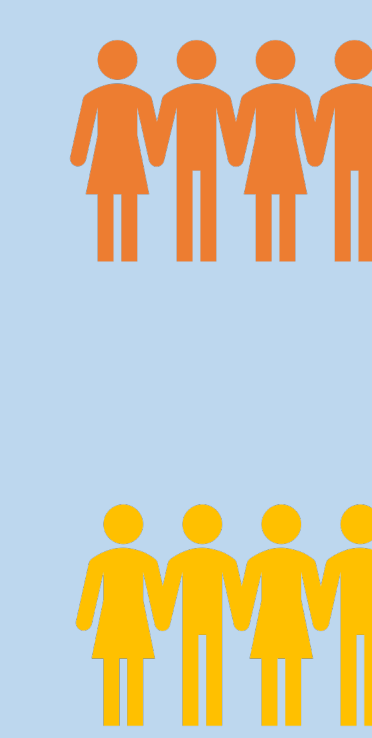
No change was identified between the experimental (MDD and MD) and the Control group (HC and WD)



HOW MEDITERRANEAN & WESTERN DIET AFFECTS THE BRAIN



Previous studies indicate that diet influences the gut microbiome as a bidirectional relationship exists between the gut and brain because it regulates the HPA-axis, inflammation, produces and controls neurotransmitters, like GABA and short-chain fatty acids, and influence the immune system and gut barrier



	Breakfast	Lunch	Dinner
Monday	1 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.
Tuesday	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.
Wednesday	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.
Thursday	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.
Friday	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.
Saturday	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.
Sunday	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.	1/2 cup of oatmeal, 1/2 banana, 1/2 cup of yogurt, 1/2 cup of fruit, 1/2 cup of nuts.

EXPECTED CONCLUSION

I expect to see that the bacterial composition in MDD is significantly more diverse after six weeks on the Mediterranean diet than the Western diet and Healthy group, indicating that diet and amount of bacteria affect MDD severity and vary as a function of diet. Specifically, an increase in the abundance of Bacteroidetes and Proteobacteria, while a decrease in levels of Lactobacillus and Firmicutes led to lower rates of depression for MDD participants. Future studies should look at a causal relationship between the gut microbiome and the brain.

METHODS

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