The Effects of Depression and Multiple Sclerosis Severity on the Gut Microbiome

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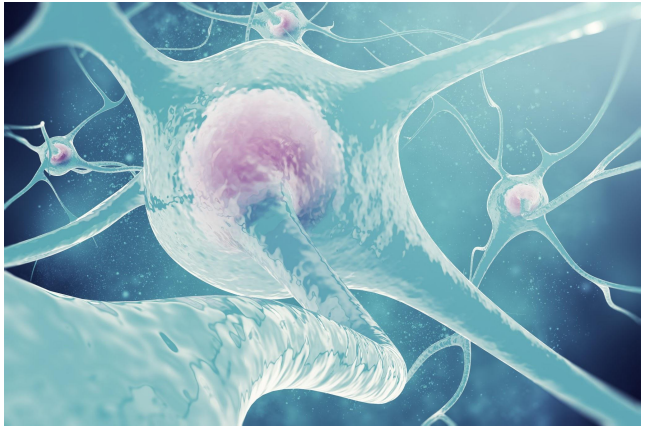
MS and Depression

- Depression is marked by persistent sadness, hopelessness, and cognitive disturbances



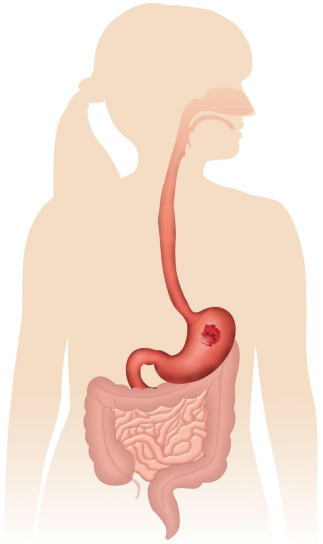
- MS is a autoimmune condition in which the body destroys myelin cells.
  - Less severe: RRMS
  - More severe: PMS

Past Literature and Gap

- MS and Depression are correlated

- Both MS and Depression have been associated with changes to the Gut microbiome in the past (Describe very briefly)

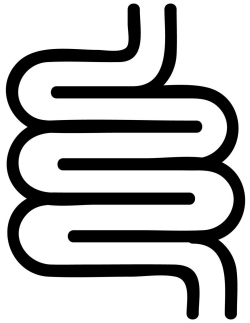
- The effects of BOTH MS and Depression on the gut microbiome have not yet been studied(is important since MS and depression are related)



Why is this important?

- The Gut Brain Axis is a bidirectional communication system between the Brain and the Gastrointestinal system (often used to implicate how our mental and physical health are connected)

- Determining if both MS and Depression together are related to changes in the gut microbiome can help us understand the Gut Brain Axis in more detail(how does both mental and physical illness affect our gut and overall health. We already know correlation, can lead to studies determining if there is Causation)



How We Addressed this

We created 6 groups from our metadata...

- No depression/No MS
- Depression/No MS
- No Depression/RRMS
- No Depression/PMS
- Depression/RRMS
- Depression/PMS

We then performed multiple analyses to discern differences in the gut microbiome between these 6 groups based on the following dataset...

Dataset used for this Study

- Our work builds on a dataset and study conducted by Cox et al.
- (describe how this dataset was collected, what it includes, sample sizes)
- (Original findings)
- Add a graphic here

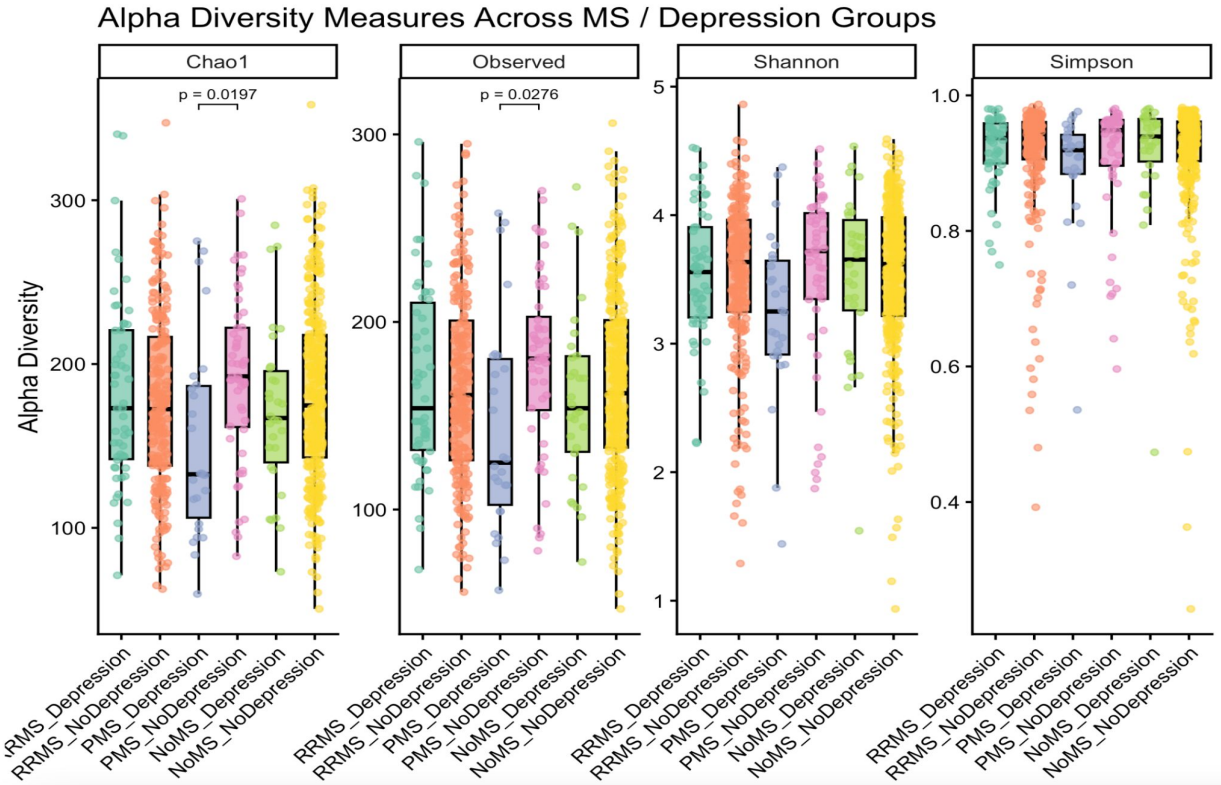
Conclusion for our study (need to write the overall conclusion here)

The analyses conducted were...

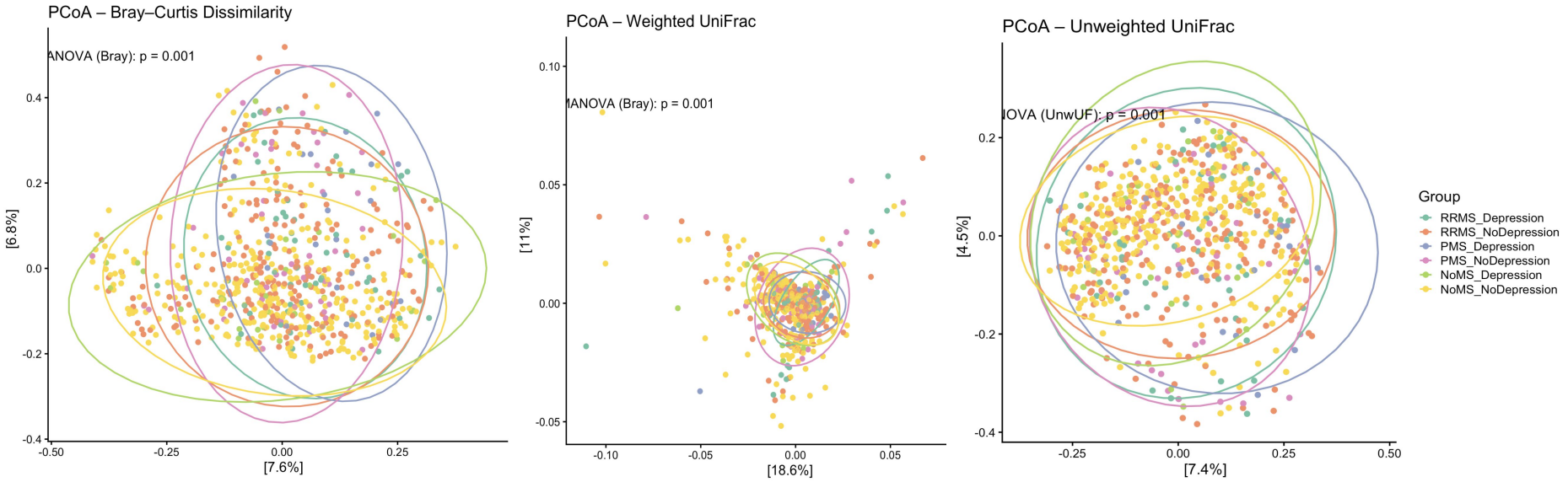
- Alpha diversity
- Beta diversity
- Core microbiome
- Indicator species
- ANCOMB2

Alpha diversity analysis revealed significant differences in gut microbiome diversity between people with just PMS, and those with PMS and depression

- Teal = RRMS/Depression
- Orange = RRMS/No Depression
- Blue = PMS/Depression
- Pink = PMS/No Depression
- Green = No MS/Depressior
- Yellow = No MS/No Depression



Beta diversity analysis revealed significant differences in the gut microbiome diversity between a number of groups

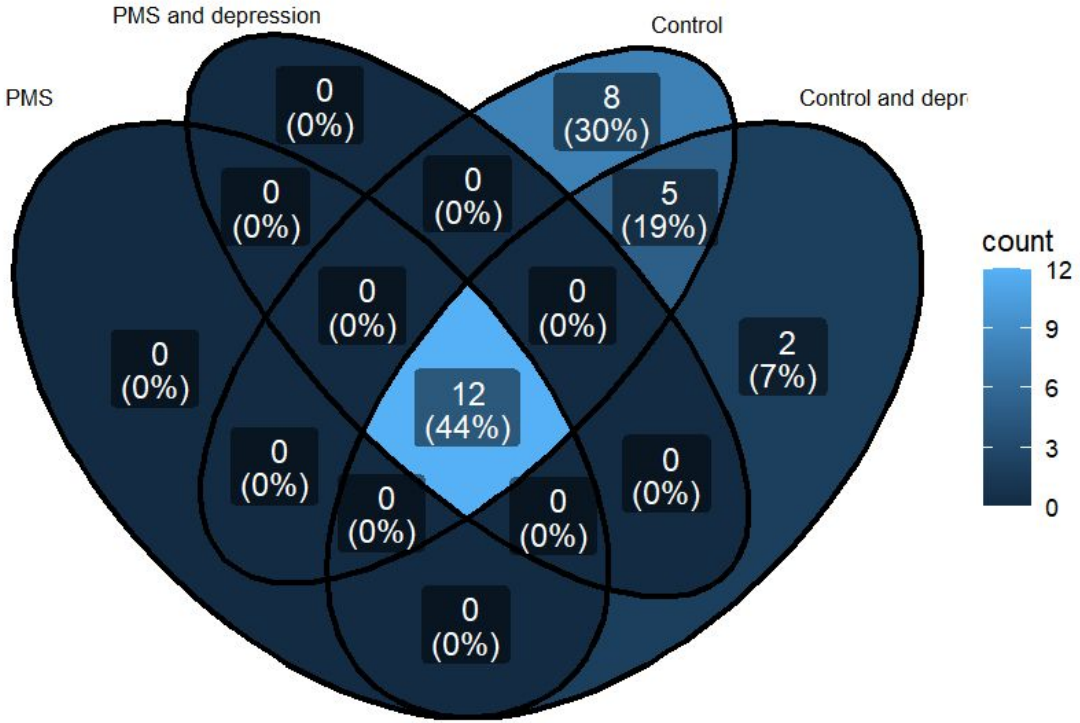


- Permanova revealed significant microbial differences based on each of the diversity metrics, indicating a pairwise analysis was needed…

Pairwise Permanova on Beta Diversity Metrics revealed Significant DIfferences in the microbiome between a number of groups

How do I add our results here? It's a pretty big table can I just summarize basic findings?

In core microbiome analysis It was found that…



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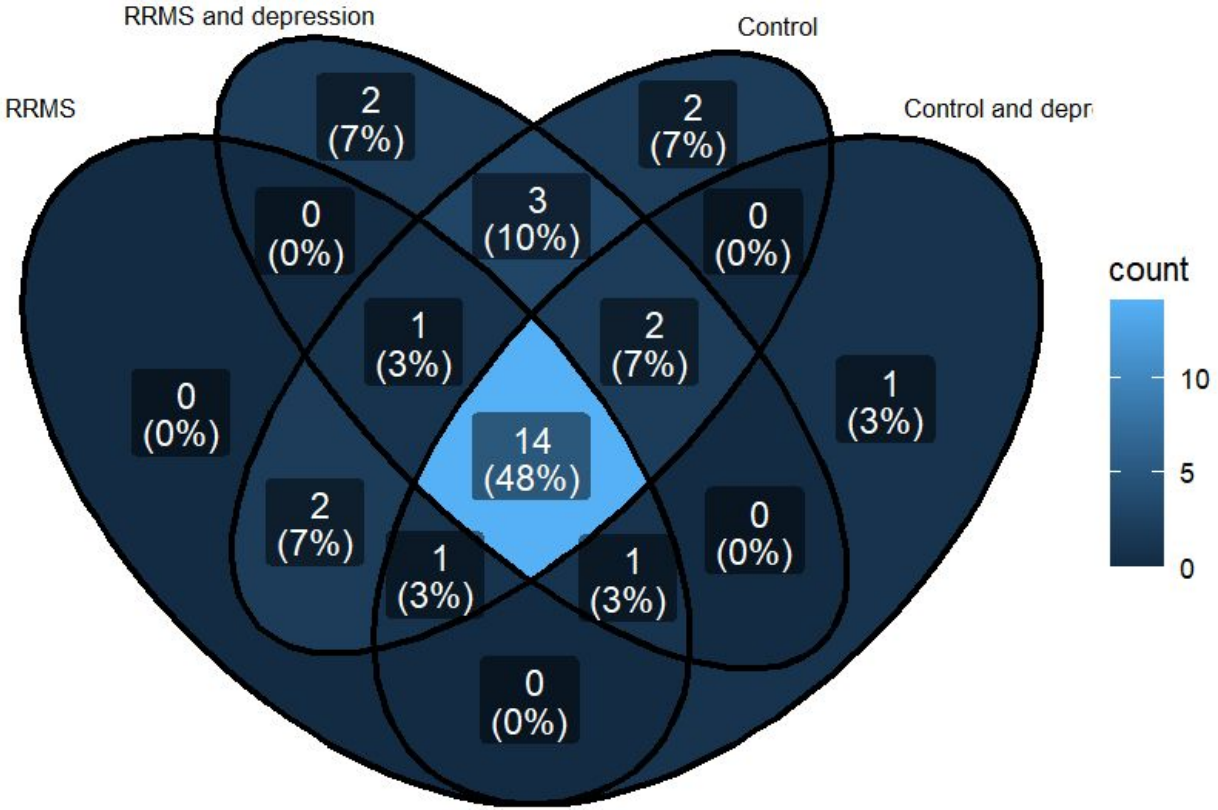

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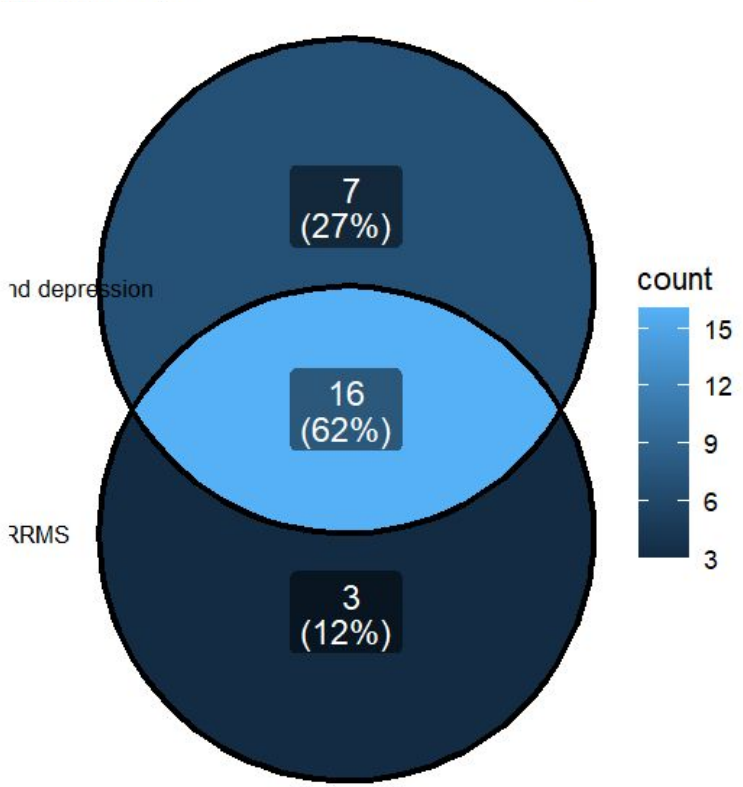

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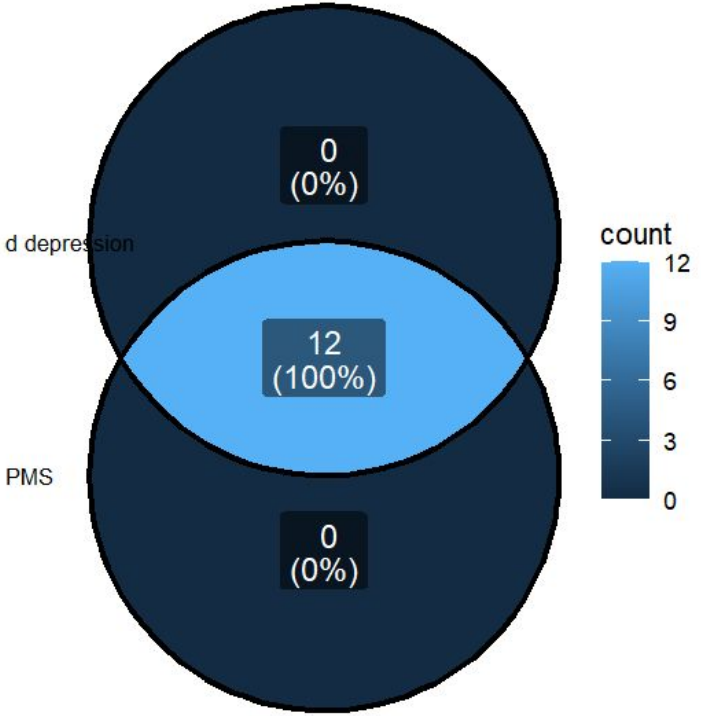
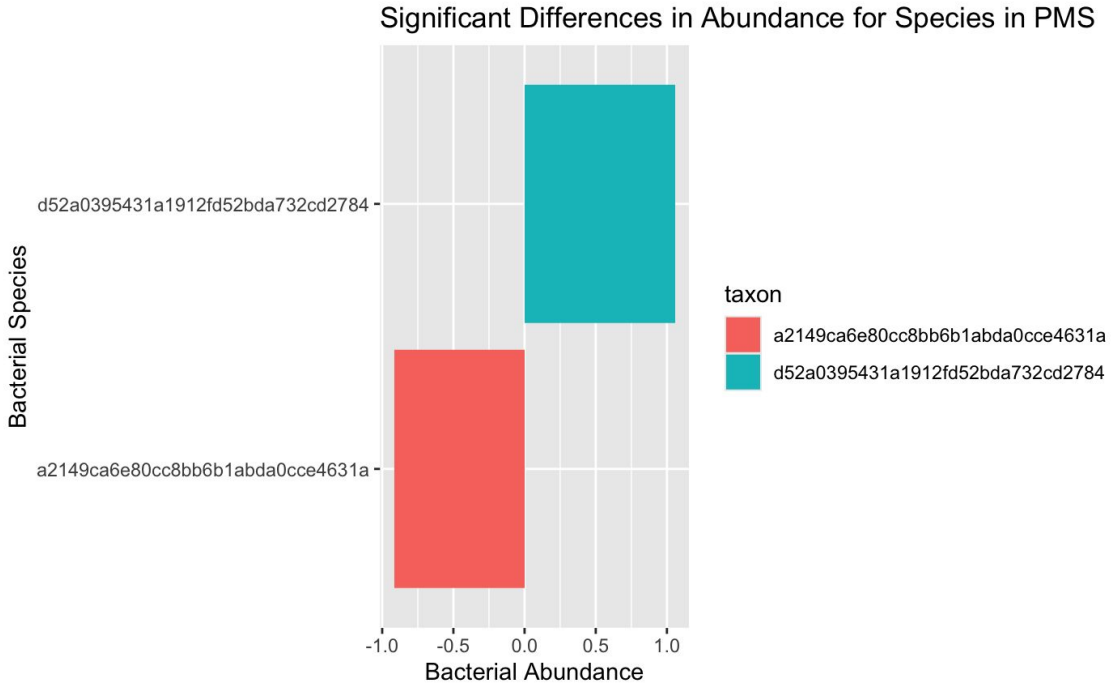


Indicator Species analysis revealed that...

	s.Control	s.Control Depression	s.PMS	s.PMS Depression	s.RRMS	s.RRMS Depression	index	stat	p.value
130a8330(	0	1	1	1	1	1	62	0.506496481	0.003
fa40a49dc	0	1	1	1	1	1	62	0.53363323	0.006
b9b0d7b9{	1	0	1	1	1	1	61	0.561258136	0.006
7ef15f834(	0	1	1	1	1	1	62	0.695477672	0.001
51aa2158:	0	1	1	1	1	1	62	0.520960889	0.002
896666ba{	1	1	1	0	1	1	59	0.567843852	0.015
14e5bc76(	0	1	1	1	1	1	62	0.610217622	0.001

In ANCOM-bc2 analysis, Differences In Bacterial Abundance Was found to be significant in individuals with PMS

How do we find the species name