Analyzing probiotic impact in the gut microbiome of Drosophila to alleviate symptoms of Seasonal Affective Disorder

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Problem Statement

While previous studies have shown a link between the state of the gut microbiome and neurological conditions, research is sparse on the investigation of seasonal depression. This is notable because the induction of SAD differs from other mental illnesses and forms of depression, as it is directly based on outside factors such as shorter days and extended periods of darkness.

Hypothesis

If probiotics containing Lactobacillus acidophilus and Lactobacillus rhamnosus are administered to improve the gut microbiome of depressed Drosophila, then the Drosophila will display an increased motivation to attempt to access a sucrose reward throughout various behavioral assays because the diversity of bacteria in the gut microbiome correlates with an improved mental state.

Background

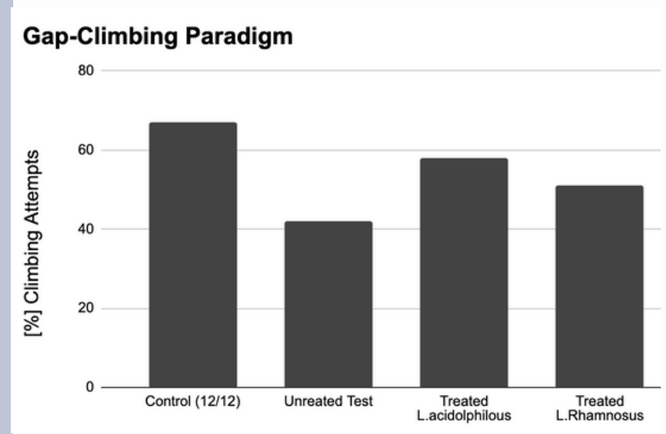
- Seasonal affective disorder (SAD) is a subtype of depression/bipolar disorder that begins and ends around the same time each year due to the change in seasons
- People struggling with the disorder report social withdrawal, feelings of helplessness, low energy, weight gain, and oversleeping.

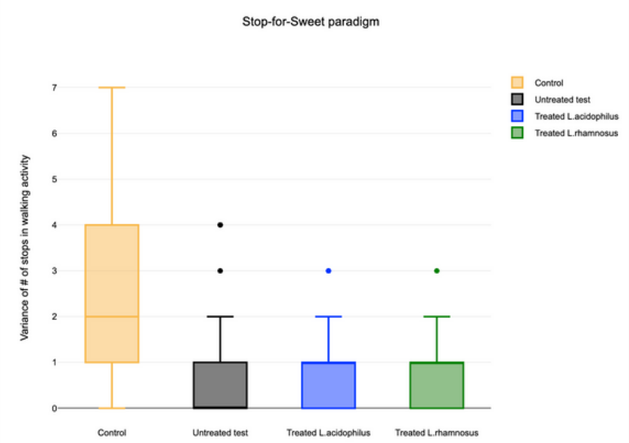
- The connection between the Enteric Nervous System (ENS), located in the gastrointestinal system, and the Central Nervous System (CNS), as a result of the vagus nerve, establishes a link between the state of the gut microbiome and neurological conditions.
- Patients diagnosed with mental conditions, including depression, have demonstrated gut microbiome dysbiosis, an imbalance in bacterial composition such as the loss of beneficial bacteria and diversity of microflora (Limbana et al., 2020).

Main Takeaway

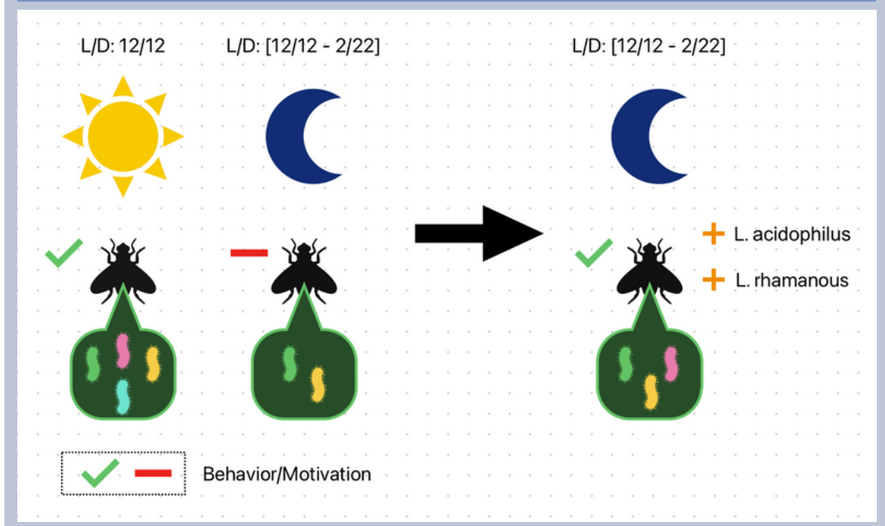
Drosophila under an SAD-simulated environment will develop circadian misalignment and display reduced motivation and desire for pleasure

Results

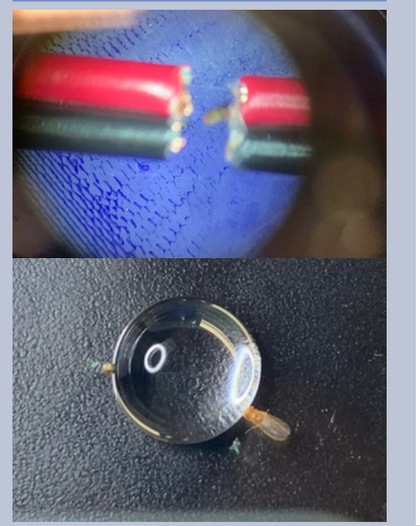




Graphical Abstract



Assays



Analysis

There was a 38% and 21% increase respectively from the untreated test group and the treated L.acidophilous and L.rhamnosus on the gap-climbing assay.

There was a 33% and 14% increase respectively from the untreated test group and the treated L.acidophilous and L.rhamnosus on the stop-for-sweet

Future Steps

- Include a wider variety of probiotics to have more variability on which ones could be the most effective
- Evaluate the effect that certain depression medications have on the gut microbiome .

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