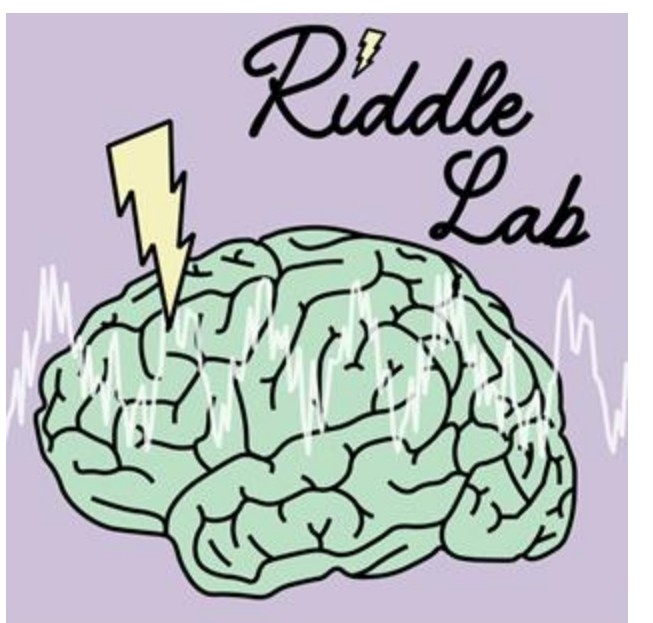




Substance Use Symptoms and Effort-Based Decision-Making in Anhedonic Depression

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Introduction

- **Substance use disorders (SUDs)**, including **alcohol use disorder (AUD)**, are associated with alterations in **reward processing and decision-making** (Koob and Volkow, 2016).
- **Anhedonic depression** involves **reduced reward sensitivity and motivation**, which may influence how individuals allocate effort when pursuing rewards (Pizzagalli et al., 2005).
- **Effort-based decision-making tasks** measure willingness to exert effort for potential reward and provide insight into motivational processes (Treadway et al., 2009).
- The **Streamlined Effort Expenditure for Reward Task (SEEFRT)** is an effort-based task in which participants choose between a low-effort/low-reward option and a high-effort/high-reward option, allowing researchers to **measure effort allocation and responses to failure**³.
- Because both **SUDs and anhedonia involve disruptions in reward processing**, examining effort-based decision-making may clarify how substance use symptom severity relates to motivational behavior in individuals with anhedonic depression.

Hypothesis

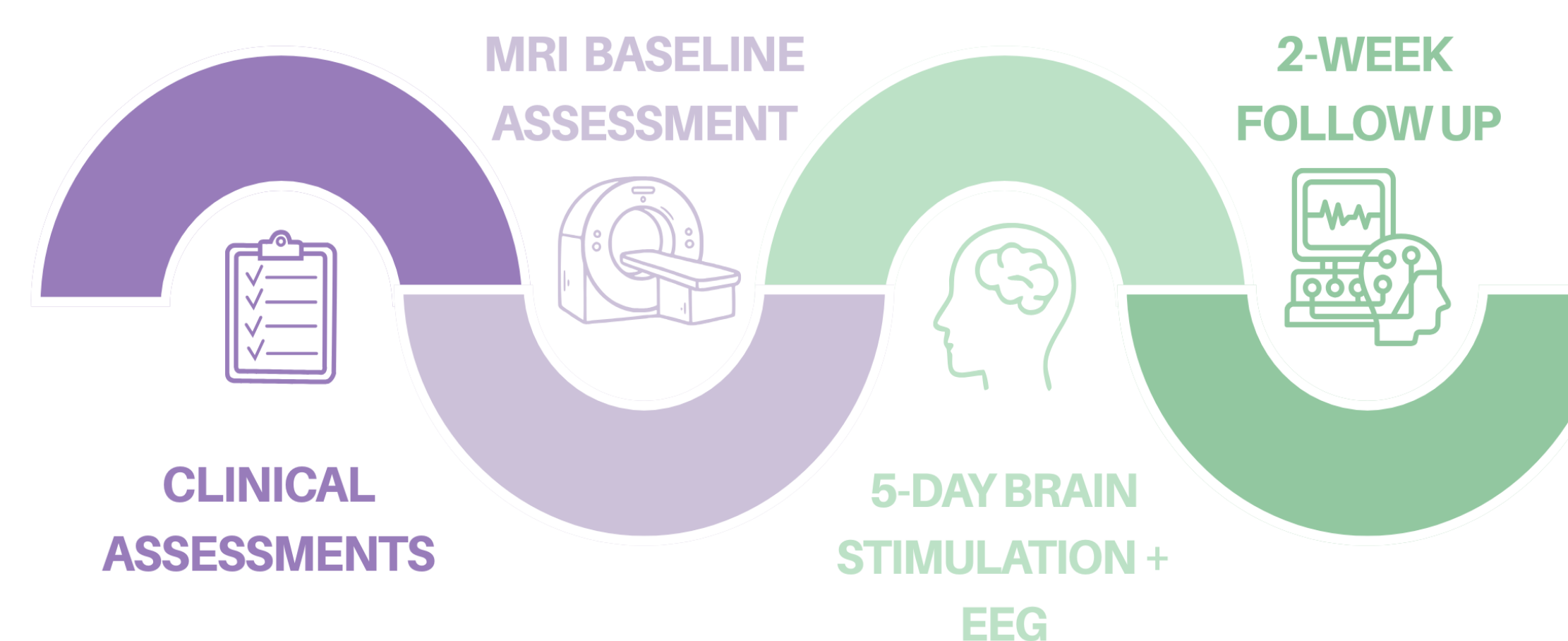
- Higher substance symptom severity will be associated with **lower hard task selection and lower persistence following failure**.

Societal Relevance

- **SUDs and depression often co-occur**¹, contributing to a large public health burden.
- Understanding how **substance use symptoms relate to motivational processes** may help improve insight into behavioral functioning in individuals with depression.
- Findings from **effort-based decision-making tasks** may help inform future treatments targeting motivation and reward processing in clinical populations.

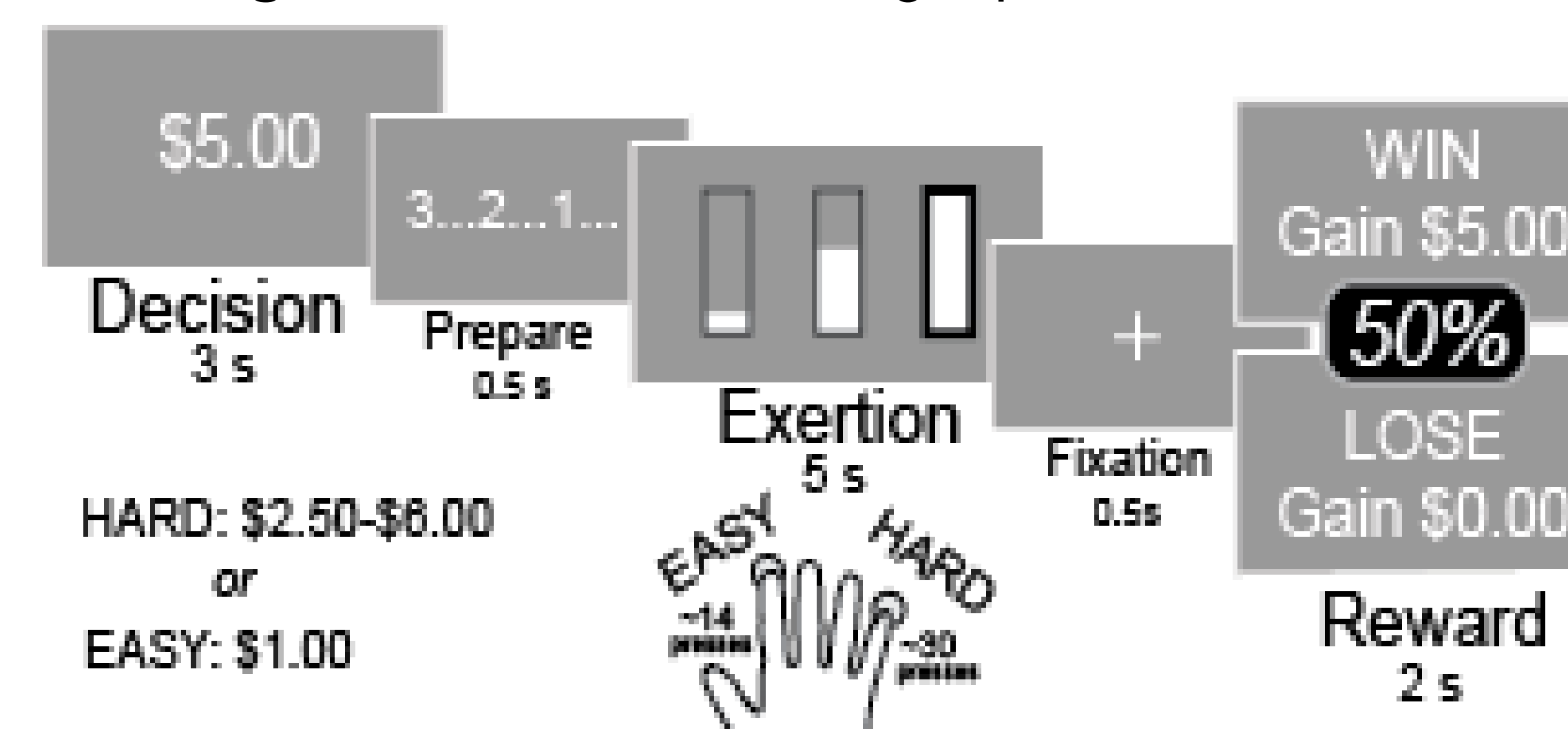
The Experiment

- **Participants with anhedonic depression** (N = 30) completed the **Hamilton Depression Rating Scale (HAM-D)** and the **MINI International Neuropsychiatric Interview (MINI)** to assess **AUD and SUD symptoms**
- **AUD and SUD symptoms** were summed to create a **total substance symptom severity score**
- Participants completed an **8-session protocol**, including:
 - **Clinical assessments** using the MINI+ HAM-D
 - **Magnetic resonance imaging (MRI)** baseline assessment
 - **5-day transcranial alternating current stimulation (tACS)** treatment paradigm
 - On **Day 1 and Day 5**, participants completed the **SEEFRT** task
 - **2-week electroencephalogram (EEG)** follow-up



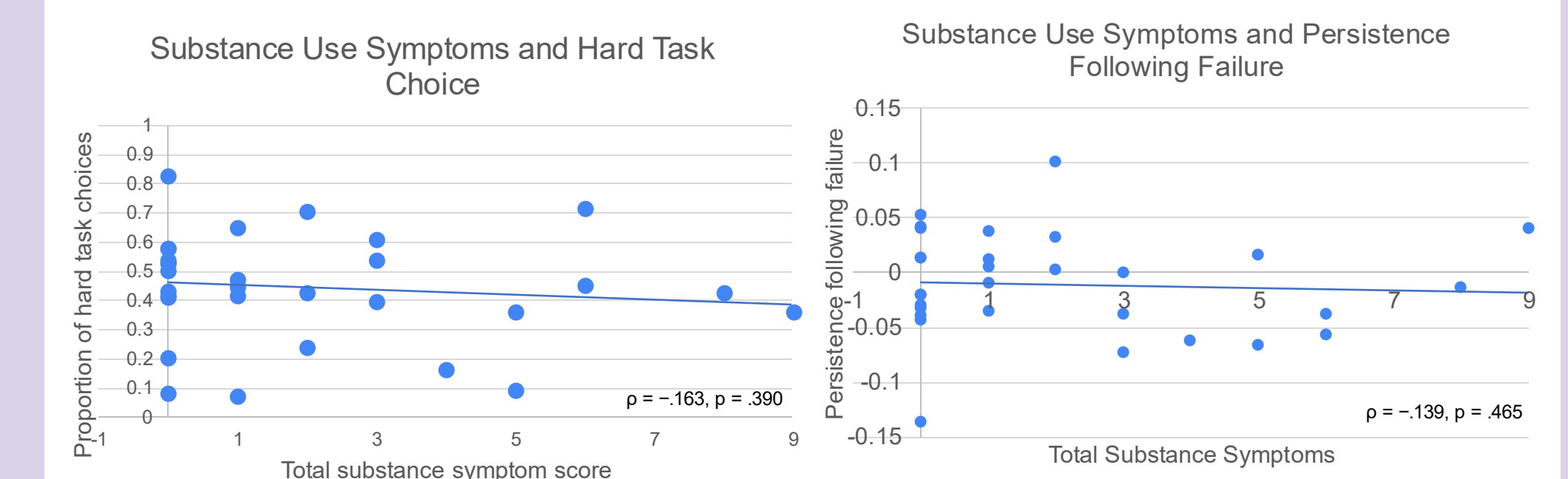
Streamlined Effort Expenditure for Reward Task (SEEFRT)

- Designed to measure how individuals make decisions when faced with different levels of **effort** and **reward**
- Based on the original **Effort Expenditure for Rewards Task (EEfRT)**³
- **Task Conditions:**
 - **Easy Task**
 - Participants press the **"J" key** with their index finger to complete a **low-effort task** for a smaller potential reward
 - **Hard Task**
 - Participants press the **";" key** with their pinky finger to complete a **higher-effort task** for a larger potential reward



Results

- **Spearman correlations** examined associations between **total substance use symptom severity** and **effort-based decision-making** during the SEEFRT task.
- Total substance symptom severity was **not significantly associated** with overall hard-task selection ($\rho = -.163, p = .390$) or persistence following failure, measured as the likelihood of selecting the hard task after a failed trial ($\rho = -.139, p = .465$).



Discussion

- **Anhedonic depression is associated with reduced reward sensitivity and motivation**, which may have reduced variability in effort-based decision-making in this sample and made associations with substance use symptom severity more difficult to detect.
- **Limitations include a small sample size** (N = 30) which may have limited statistical power and variability.
- **Future research with larger and more clinically diverse samples** may help determine whether substance symptom severity influences motivational persistence and effort-based decision-making.

Acknowledgements

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References

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2. Pizzagalli DA, Jahn AL, O'Shea JP (2005) Toward an objective characterization of an anhedonic phenotype: a signal-detection approach. *Biol Psychiatry* 57: 319–327
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