



The present study develops a representative rodent model of food insecurity that integrates both variable diet quality and variable predictability of food access. Male and female C57BL/6J mice were raised on either standard chow or a "Typical American Diet" and subjected to random temporary removal of assigned food. Behavioral assessments at 7 months revealed significant and trending effects on anxiety-like behavior, locomotion, and spatial memory. These findings suggest that chronic, unpredictable food access can lead to lasting cognitive and behavioral changes, which supports the model's utility for investigating the neurobehavioral and immunological consequences of food insecurity.

Introduction

- Over 6 million households with children in the U.S. experience food insecurity, either with or without hunger, and this is only expected to increase over time.
- Experiencing food insecurity predisposes individuals to developing psychological disorders like anxiety, depression, and eating disorders as well as adverse physiological conditions like malnutrition and chronic inflammation.
- Both the quality of the food eaten and the reliability/consistency of an individual's food source contribute to an individual's food security status, but both of these factors are not often concurrently assessed in the experimental literature.
- Animal models have only recently started to be used to model food insecurity and, as such, there is a need in the field for a truly representative model of insecurity that assesses the combined and interactive effects of diet quality and food source reliability on inflammation and cognition.

Conclusions

- Several significant behavioral differences were observed in both male and female mice, with patterns varying depending on diet consumed.
- Anxiety-like behavior increased for insecure male mice fed standard chow (not TAD) while more locomotion is observed in secure female mice fed TAD (not standard chow).
- Insecure standard-fed mice had improved spatial memory capabilities, compared to secure mice.

Methods

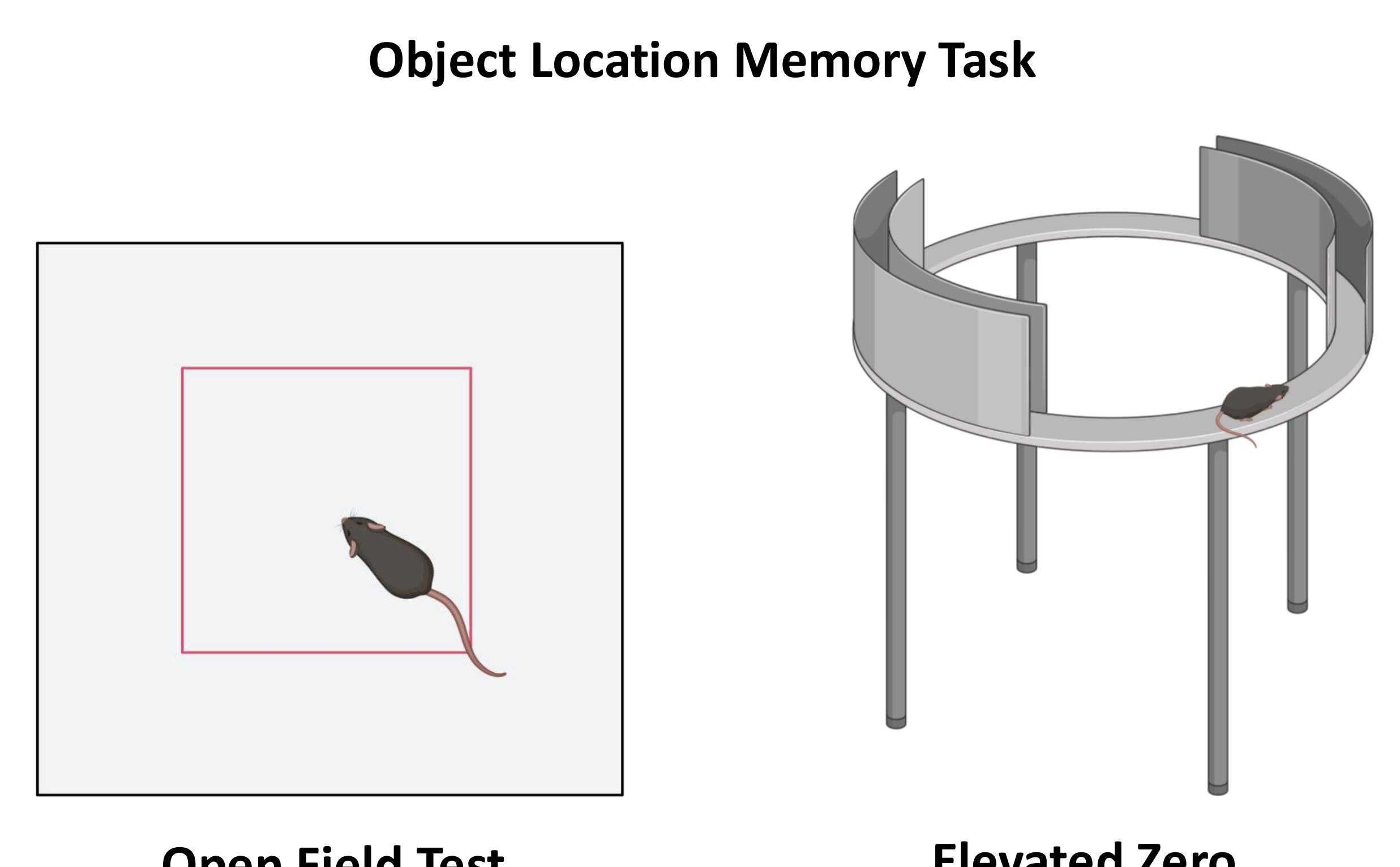
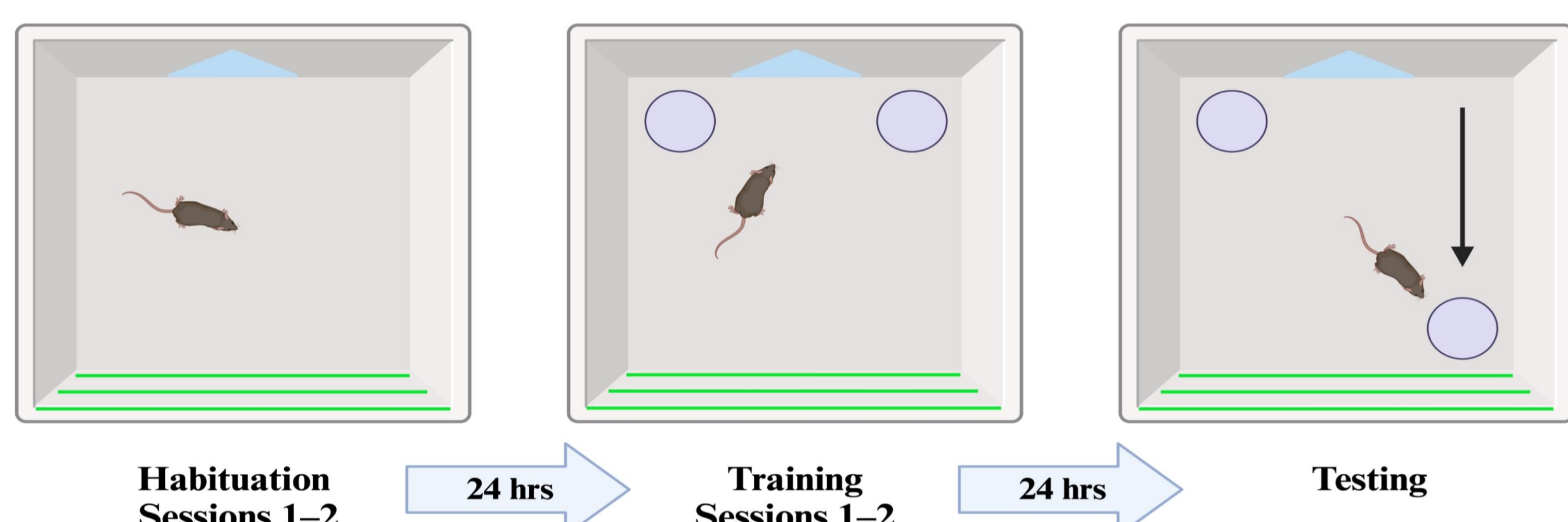
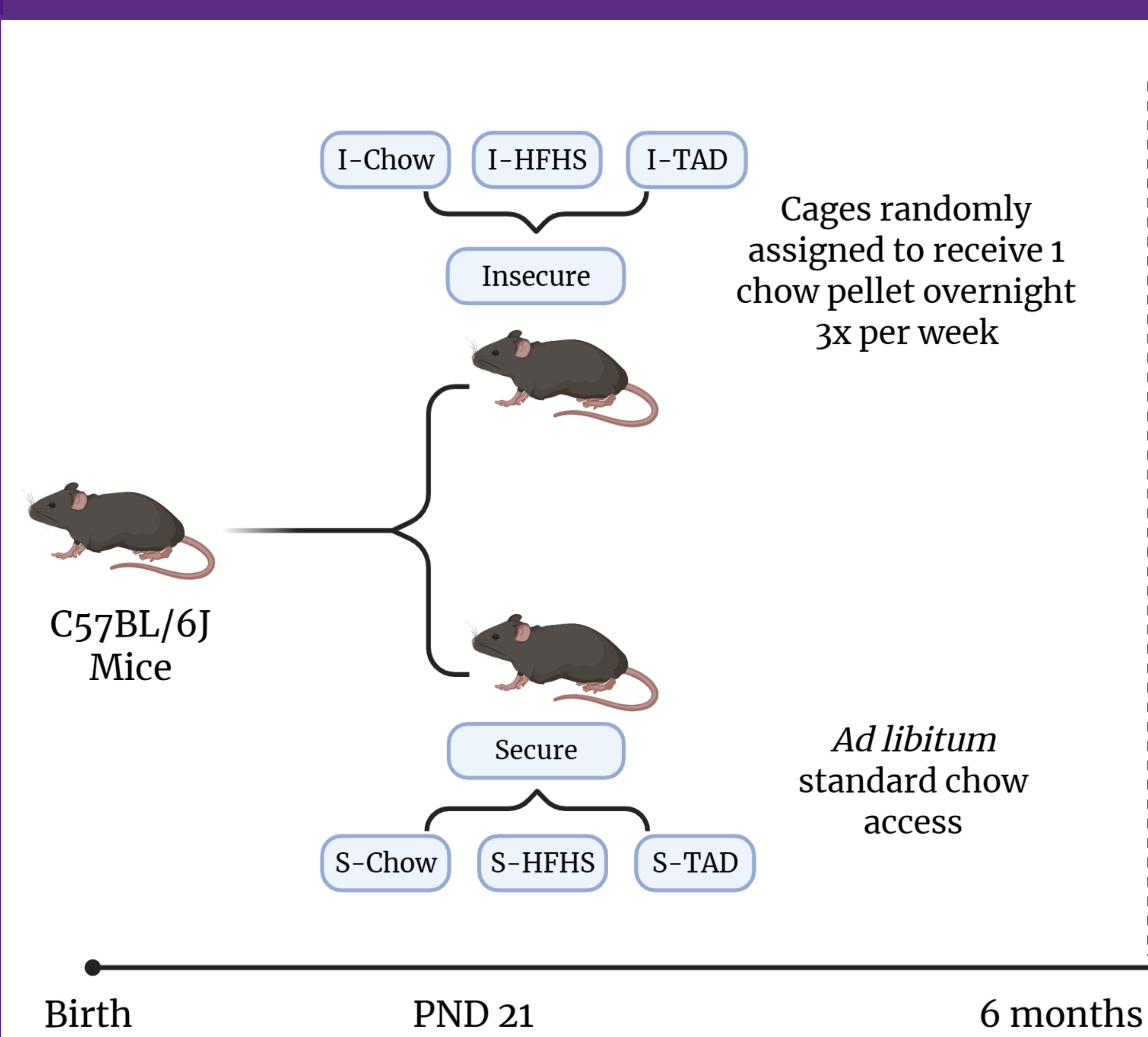


Figure 1. Behavior testing apparatus.

Behavioral Testing Results

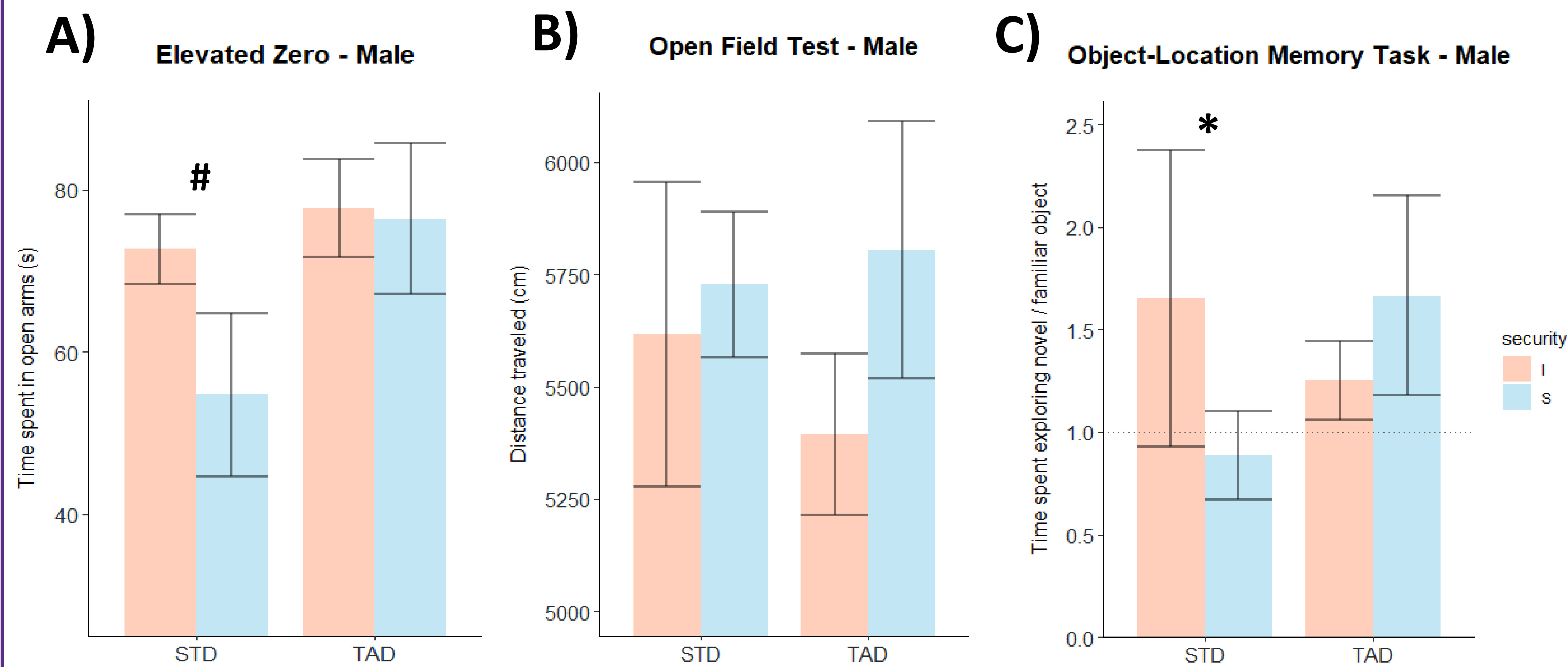


Figure 2. Anxiety-like behavior, locomotion, and spatial memory in male mice. 2-way ANOVAs revealed a trending effect in (A) anxiety-like behavior, no differences in (B) locomotion, and significant differences in (C) spatial memory. # = $p \leq 0.07$, * $p \leq 0.01$.

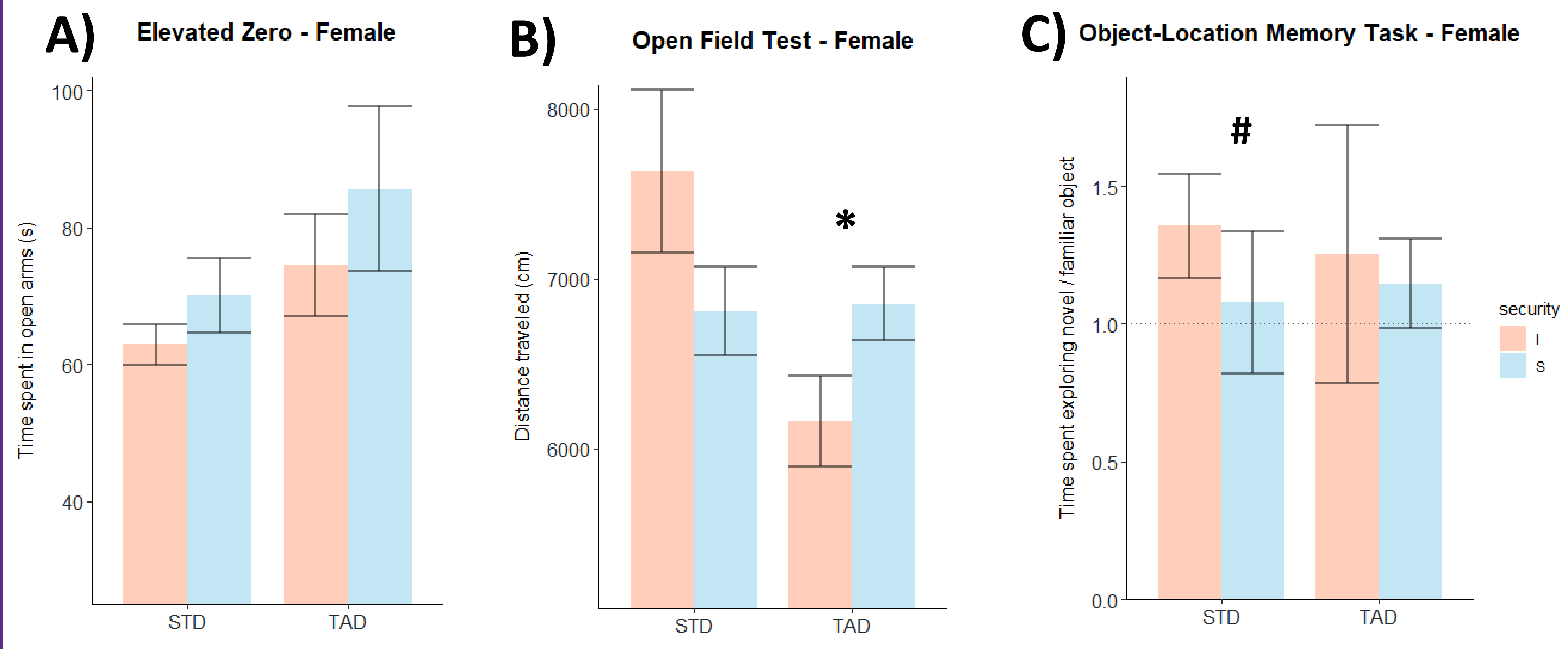


Figure 3. Anxiety-like behavior, locomotion, and spatial memory in female mice. 2-way ANOVAs revealed no difference in (A) anxiety-like behavior, a significant difference in (B) locomotion, and a trending effect in (C) spatial memory. # = $p \leq 0.07$, * $p \leq 0.02$.

Future Directions

- Perform rt-PCR on collected tissue and serum samples to look for any differences in inflammatory cytokine levels
- Fill in cohorts with mice fed higher-fat content diet (~60% kcal from fat) to better establish how the predictability of a food source may interact with the quality of one's diet
- Analyze behavioral data from Y-maze to assess short-term spatial memory by counting spontaneous alternations during testing

References

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