

Introduction/Hypotheses

- Chronic Mild Stress (CMS) has been proven many times to be an effective model for measuring anhedonia in rats.
 - Previous studies have focused on CMS with single-housed rats rather than group-housed rats.
 - This study investigates housing circumstances and their influence on social creatures, who experience stress under isolation.
 - There are two cohorts of rats being studied: cohort 1 (C1) contains rats in group housing conditions and cohort 2 (C2) contains rats in single housing conditions.
- Hypothesis:**
- Rats in C2 will experience more stress than C1 rats.
 - The differences between stress and non-stress rats in C1 will be more drastic than in C2.

Methods (Cont.)

- Reversal Learning** (figure 2) - Rats are placed in a plus-shaped maze (image 1) that has one arm blocked (East/West) into a T-shape with one pellet placed at the high reward arm (N/S). High reward arm has an 80% chance of having a sugar pellet which has been counterbalanced between rats, and the chance for the low reward arm is 20%. Training includes helping rats acclimated to the maze and block. The goal is to have the rats prefer the 80% arm (9/10 trials) over the 20% arm. After rats have demonstrated retention of the discrimination (5/6 trials), reward arms are switched, and rats must reverse their preference (9/10 trials). (Note: may want to include visuals)

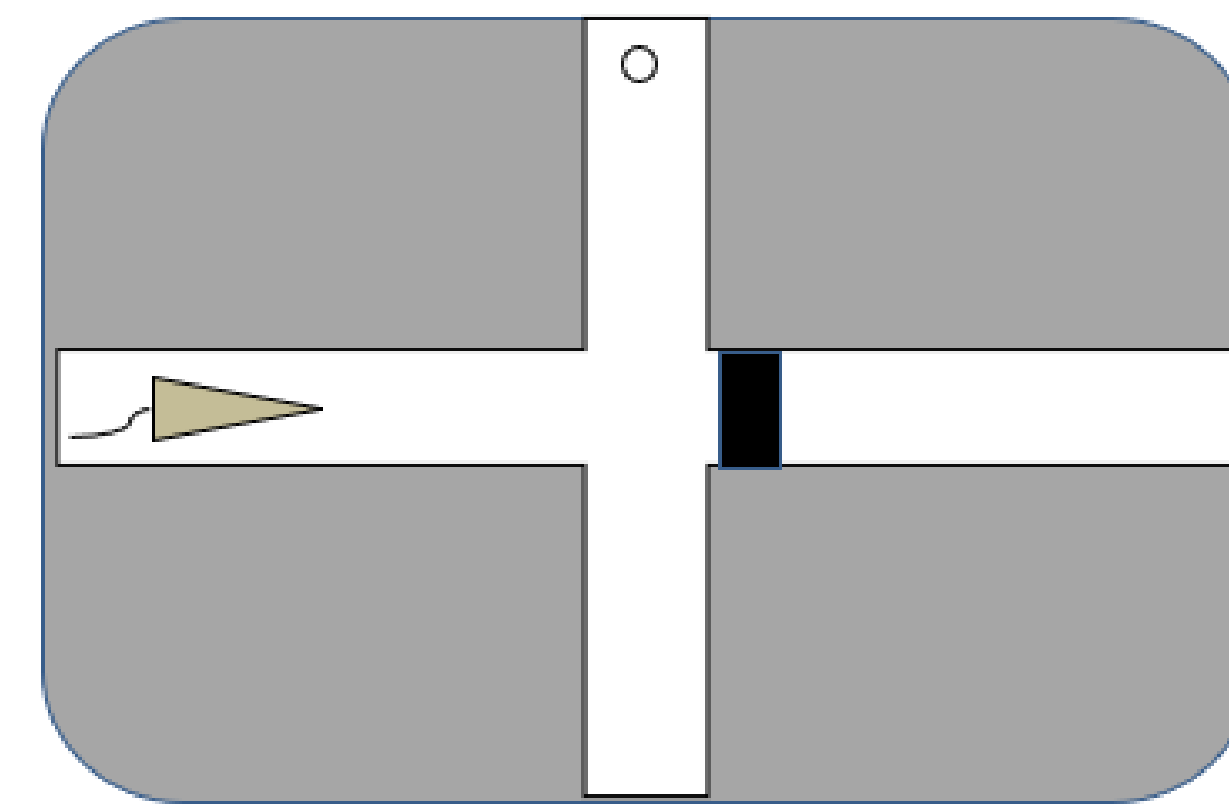


Image 1: Reversal Learning Maze Diagram

Average Spontaneous Alternation Ratios for Cohort 1 and Cohort 2

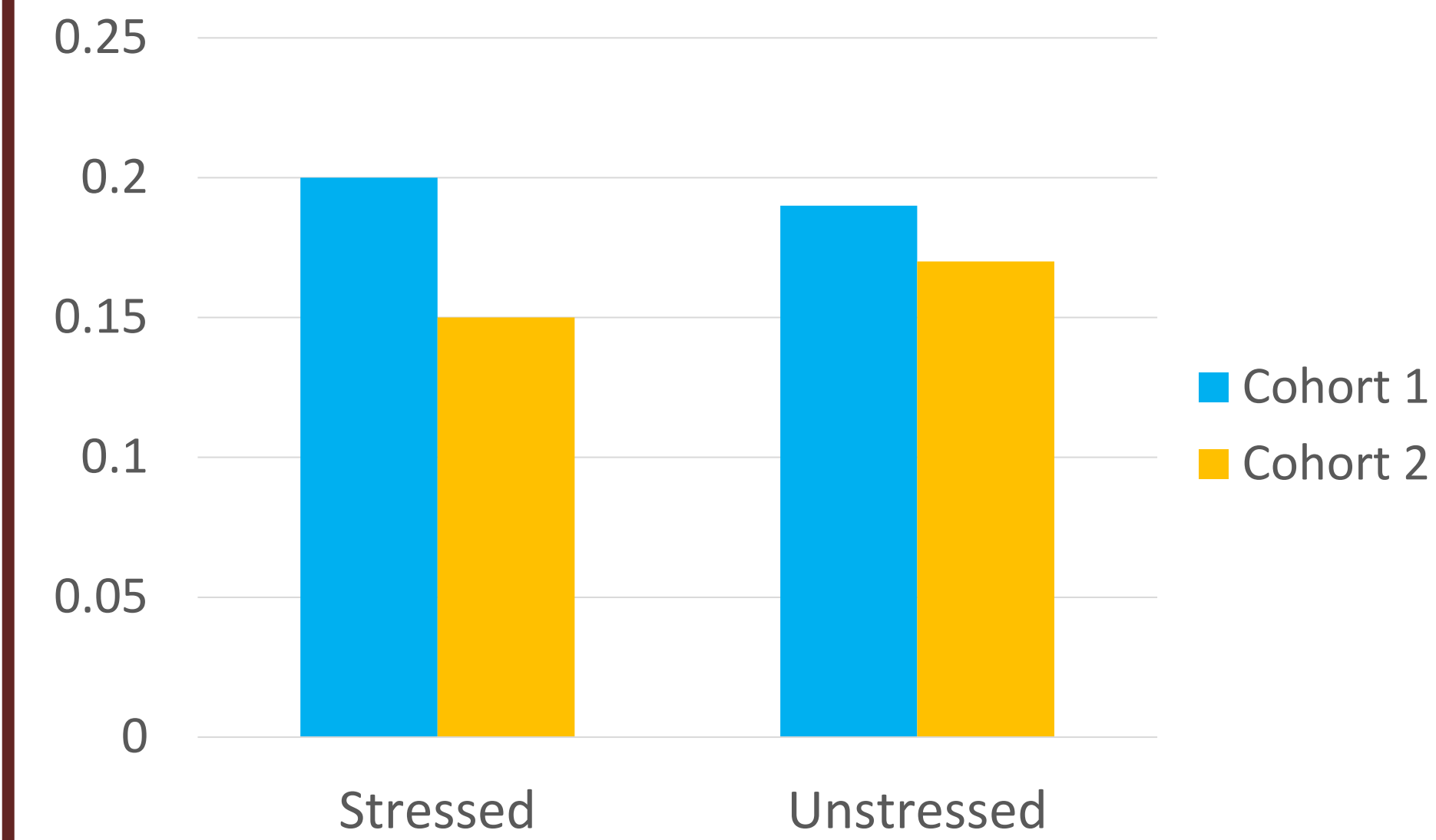


Figure 1: Rats display greater differences on the Spontaneous Alternation task in Cohort 2.

Performance on Behavior Protocols

Weight Differences as Percentages Between Cohorts

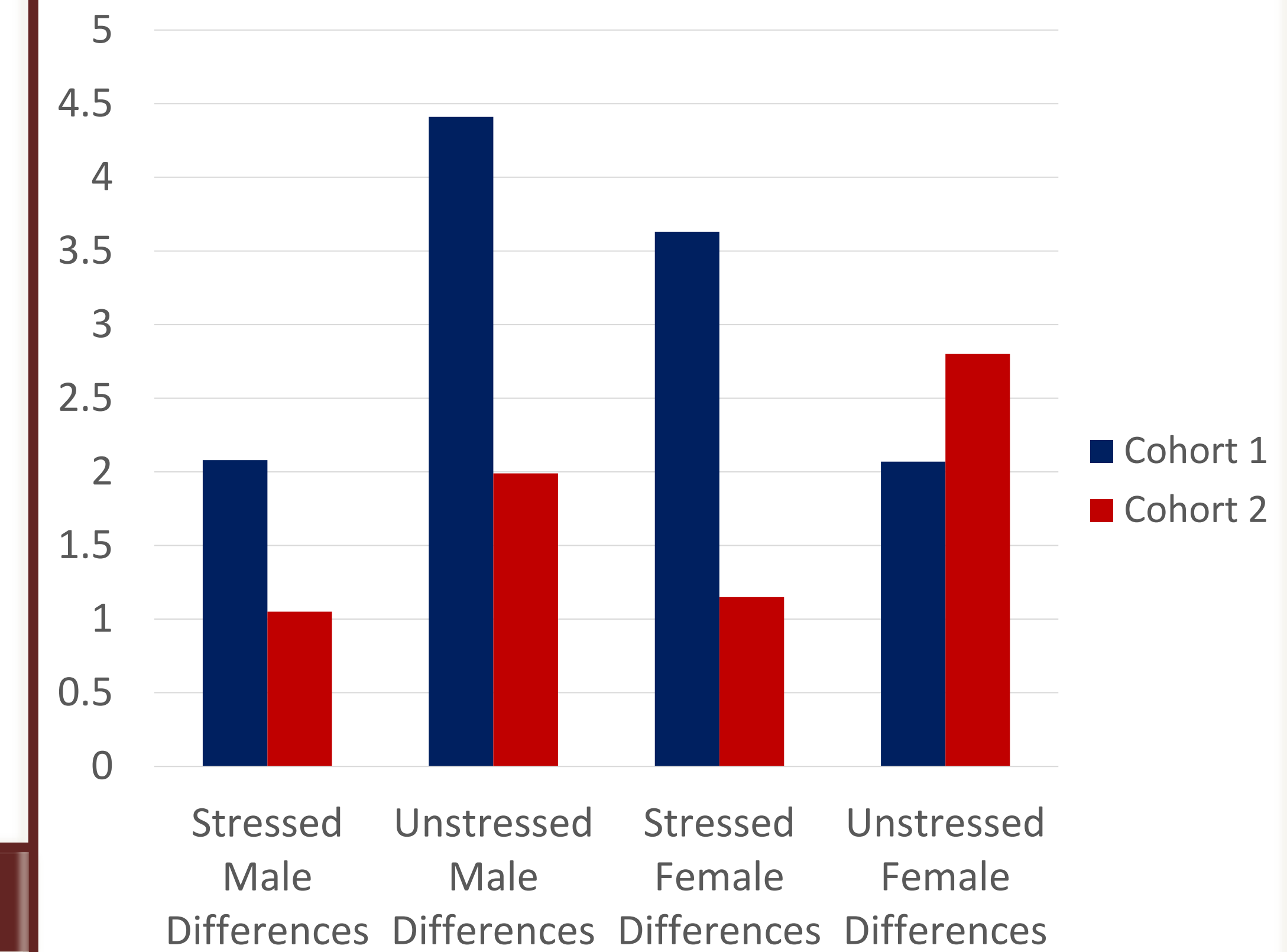


Figure 5: Cohort 1 displays greater weight differences than Cohort 2 in most groups.

Summary and Discussion

- The hypothesis was supported because rats in Cohort 2 showed significant differences within CMS and behavior protocols.
- Rats in Cohort 2 had the largest difference between the number of trials for a successful reversal between the stressed and unstressed rats yet showed similar relationships in difference between stressed and unstressed on trials to acquisition and retention. Cohort 2 in general required more trials to complete the task. This could be indicative of the isolation being stressful on its own.
- Unstressed rats in both cohorts follow similar times for each of the Forced Swim trials. Stress rats in both cohorts spent more time swimming than the unstressed rats, and stressed rats in Cohort 2 spent more time than all rats diving.
- Cohort 2 showed a greater preference for sucrose, but Cohort 1 had a significant difference between the stressed and unstressed rats.
- Cohort 2 displayed greater differences in Spontaneous Alternation than Cohort 1. Rats in Cohort 1 showed a small and less significant difference.
- Rats in Cohort 1 had a larger weight fluctuation with stressed versus unstressed rats compared to Cohort 2. Cohort 1 had a significant difference between stressed male versus stressed female rats, and unstressed male versus unstressed female rats as well.

References/Acknowledgements

All authors contributed to this poster equally.

Methods

Subjects

- A total of 24 Sprague Dawley rats (approximately 3-8 months in age) with 12 females (insert avg weight) and 12 males (insert avg weight) were used.
- Cohort 1 (n = 16) includes 8 males (D1-D8) and 8 females (D9-D16) divided evenly into stress (D1-D4, D9-D12) and non-stress (D5-D8, D13-16) groups.
- Cohort 2 (n = 8) includes 4 males (E1-E4) and 4 females (E7-E10) divided evenly into stress (E1, E2, E7, E8) and non-stress (E3, E4, E9, E10) groups.

Conditions and Design

CMS

- Strobe Light** - Rats were left in a dark room during their night cycle and strobe lights cycled between on and off at 30-minute intervals.
- Noise** - Rats were exposed to a noise machine set on a timer cycled between on and off at 30-minute intervals during their night cycle.
- Wet Beddings** - Bedding is left moist during their day cycle
- Tilted Cages** - Bedding was reduced and cages were tilted at a 30-degree angle during their day cycle
- Spontaneous Alternation** (figure 1) - Rats are placed in a plus-shaped maze and explore the maze freely for 12 minutes. The number and sequences of each arm entry is recorded. An alternation is defined as entry into four different arms on overlapping quintuple sets.
- Sucrose Preference** (figure 4) - Rats given access to two bottles, one containing 1% sucrose and the other water. Consumption of sucrose vs. water over 24hrs was compared.
- Force Swim Test** (figure 3) - Rats are placed in a large cylinder of water for decreasing amounts of time between both sessions. The first session is 15 minutes long and the second is 5 minutes. Rats are assessed on whether they swim, float, or struggle as a measure for anhedonia.

Performance on Behavior Protocols

Reversal Learning

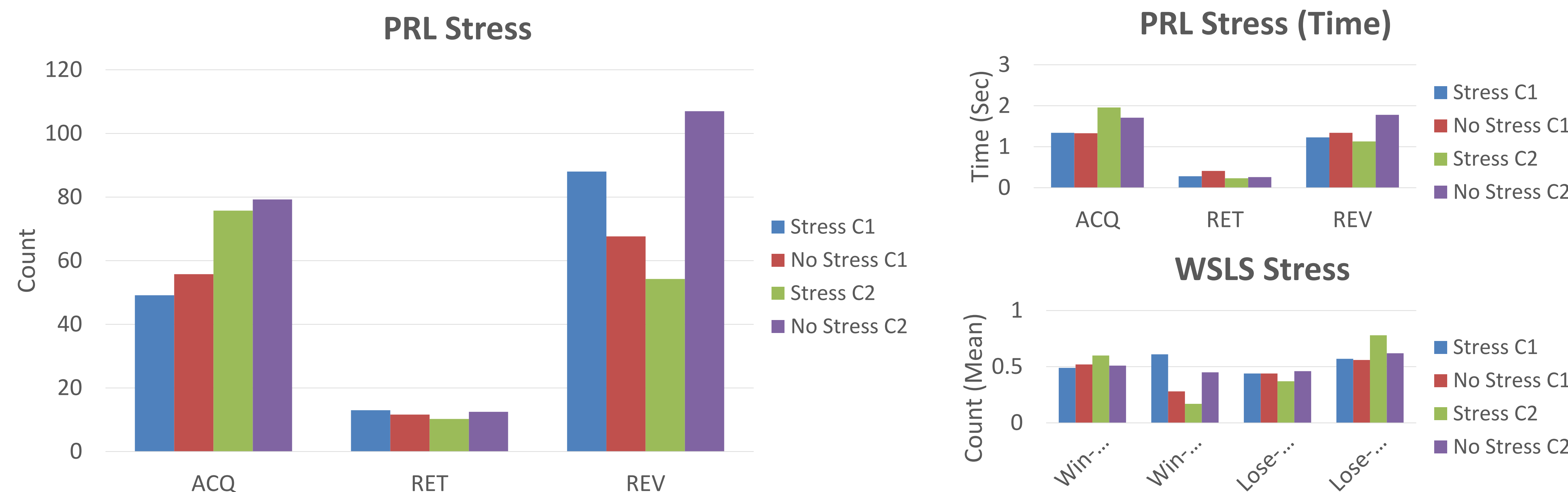


Figure 2: ACQ = acquisition trial, RET = retention trial, REV = reversal trial. Overall, C2 acquired the preference slower than C1, both cohorts were able to retain their learning. Reversal results seem to be inconsistent with opposite results from both cohorts though that might be due to potential outliers

Force Swim Test

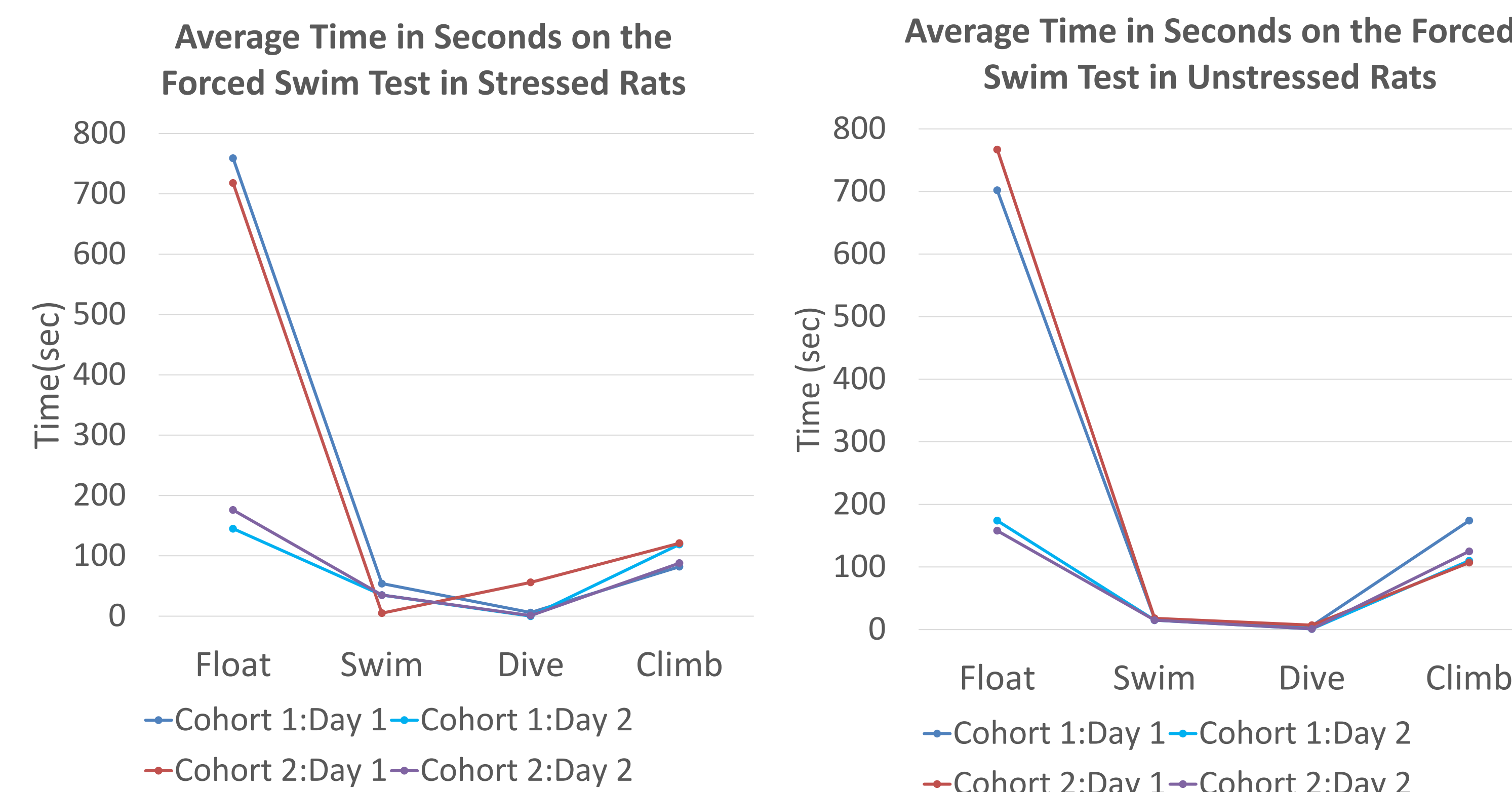


Figure 3: Stress rats in both cohorts spent more time swimming than the unstressed rats, and stressed rats in Cohort 2 spent more time than all rats diving.

Sucrose Preference Test

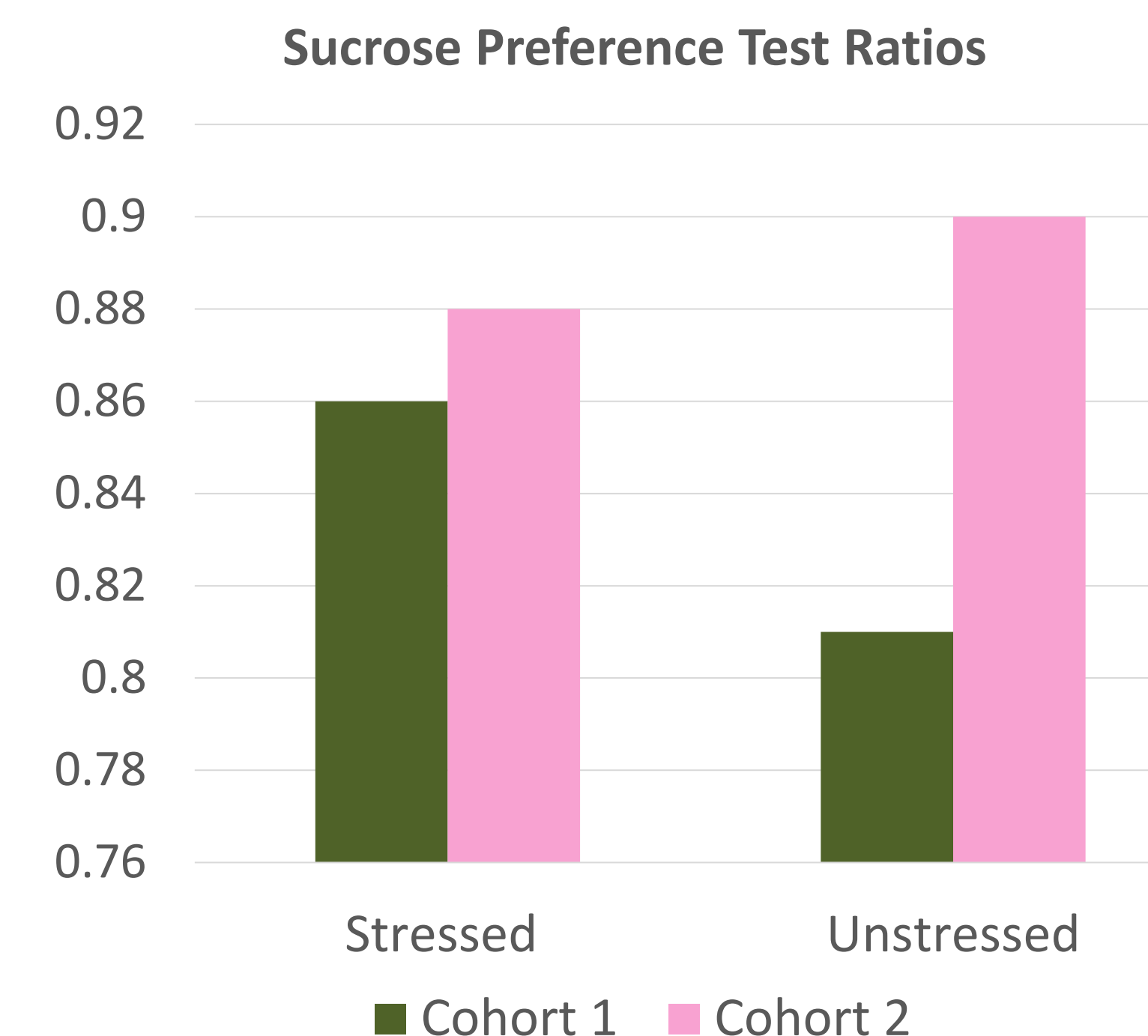


Figure 4: Rats display a greater preference for sucrose in Cohort 2. However, there is a larger difference between the stressed and unstressed groups in Cohort 1 than there is in Cohort 2.