Long-term Effects of Binge Drinking During Adolescence on Memory and Anxiety in Adult Male Rats

IANYA D’OYEN, DIVYA KAPOOR, NISHELL PRINGLE, TONIANN THOMPSON
(Shannon Harding, Alexis Khursigara, Nicole Mollé)
Why is the Research Important?

• Binge drinking is popular among high school students
  – 72% of high school students report binge drinking before graduation (www.nih.gov)
Why is the Research Important?

• Adolescence is a critical period of development for the brain
  – Can be disrupted even with small amounts of alcohol (Roskam et. Al., 2009)
What Have Other Studies Found?

• Memory
  – Even small amounts of alcohol during adolescence can impair memory (Ryabinin et. al., 2002)

• Anxiety
  – Alcohol influences chemical messengers in the brain important in controlling fear and anxiety (Wallner et. al., 2003)
Our Research Question:

• How does binge drinking during adolescence affect memory and anxiety in adult male rats?
Methods and Materials

- **11 male rats**: 5 given alcohol and 6 given water at 41 days old (P41) for 8 weeks
Methods and Materials

- Rats handled and marked daily
- Behavior tests were done in adulthood to determine long-term affects
Novel Object Task:
This is a test for memory.

- TRAINING

Rats put in arena with an object for 5 minutes.
Novel Object Task: This is a test for memory.

- TESTING

After 1 hour delay, rats put in arena with familiar and novel (new) object for 5 minutes.

Anymaze program tracked the rats.
Elevated Plus Maze:
This is a test for anxiety.

- Maze with 4 arms; 2 open, 2 closed.
- **Anxiety** = less time in open arms; more in closed
- 10 minute test
Elevated Plus Maze: This is a test for anxiety.

• Anymaze tracked the rat.
Results of NO Task

**Time with FAMILIAR OBJECT**

![Graph showing time in the Familiar Object zone (s) for Ethanol, Treatment, and Control groups.](image)

**Time with NOVEL OBJECT**

![Graph showing time in the Novel Object zone (s) for Ethanol, Treatment, and Control groups.](image)

P = 0.247

P = 0.302

**FOUND:** No differences between the groups.

**SUGGESTS:** No long-term effects of drinking on memory.
Results of EPM Test

**Time in OPEN ARMS**

- Ethanol: ~120 s
- Treatment: ~100 s
- Water: ~140 s

**Time in CLOSED ARMS**

- Ethanol: ~250 s
- Treatment: ~200 s
- Water: ~275 s

**P=0.672**

**P=0.778**

**FOUND:** No differences between the groups.

**SUGGESTS:** No long-term effects of drinking on anxiety.
Discussion

- There were no long term effects of binge drinking on memory and anxiety during adolescence in adulthood.
- Our study was consistent with other studies in the elevated plus maze.
  (Roskam et. Al., 2009)
Future Studies

• Dr. Harding and Nicole Mollé will be looking at the amygdala and hippocampus for differences.
Future Studies

- We would like to test female rats
- Avoid a big arena
- Test more subjects
- More tests (Mazes)