

INTRODUCTION:

- ❖ Alcohol and nicotine are two commonly co-used recreational drugs, and this co-use tends to begin in adolescence (Di Bona & Erasquin, 2014, *Journal of Child & Adolescent Substance Abuse*, 23).
- ❖ Prior studies suggest that alcohol and nicotine may be affecting the rewarding properties of one another as rats produce more robust alcohol-induced conditioned place preference (CPP) if they were previously given nicotine during their adolescence (Philpot, Engberg, & Wecker, 2014, *Behavioural brain research*, 262). This finding suggests that alcohol and nicotine may be working within similar brain reward systems.
- ❖ While studies focus on the effects of pretreating either alcohol or nicotine, and examining the effect on one another, the co-administration of alcohol and nicotine has not been examined in adult or adolescent rats. The latter is surprising, given that adolescence is the developmental period that these drugs are usually first consumed.
- ❖ Thus, this study will attempt to characterize alcohol reward in adolescent male and female rats and investigate the rewarding effects of alcohol and nicotine interaction.

HYPOTHESIS:

- ❖ Ascending doses of alcohol will produce more robust alcohol-induced CPP than fixed doses of alcohol.
- ❖ The co-administration of alcohol and nicotine produces a synergistic effect (more robust CPP compared to each drug independently).

METHODS:

- ❖ **SUBJECTS:** Male and female Sprague-Dawley rats (Charles River Farms, Hollister, CA) born and raised at CSULB kept on a 12:12 light/dark cycle.
- ❖ **DRUGS:**
 - ❖ *Fixed dosing pattern of alcohol:* 0, 0.5, 1.0, or 2.0 g/kg alcohol IP
 - ❖ *Ascending dosing patterns of alcohol:* 1) 0.0625, 0.125, 0.25, & 0.5 g/kg of alcohol IP; 2) 0.125, 0.25, 0.5, & 1.0 g/kg alcohol IP; or 3) 0.25, 0.5, 1.0, & 2.0 g/kg alcohol IP
 - ❖ *Nicotine injections:* 0.067 or 0.2 mg/kg nicotine SC

PRECONDITIONING (PD 23):

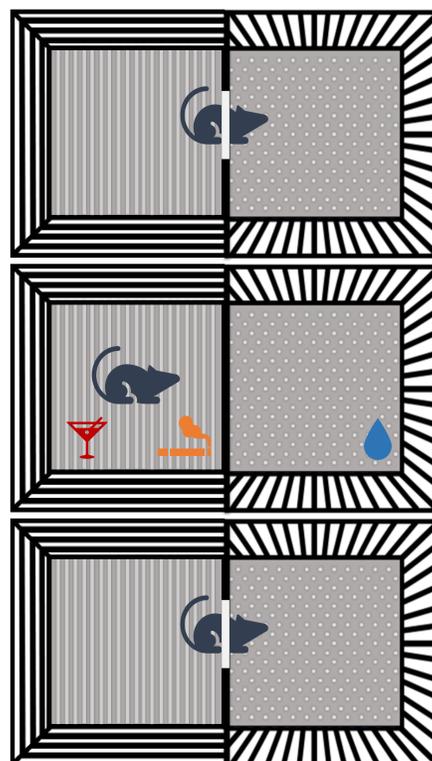
- ❖ Free access to both sides of the CPP apparatus for 15 minutes in a **drug-free state**.
- ❖ Time spent on each side will determine the **preferred side** (>50% total test time) and **nonpreferred side** (<50% total test time).

CONDITIONING (PD 24-31):

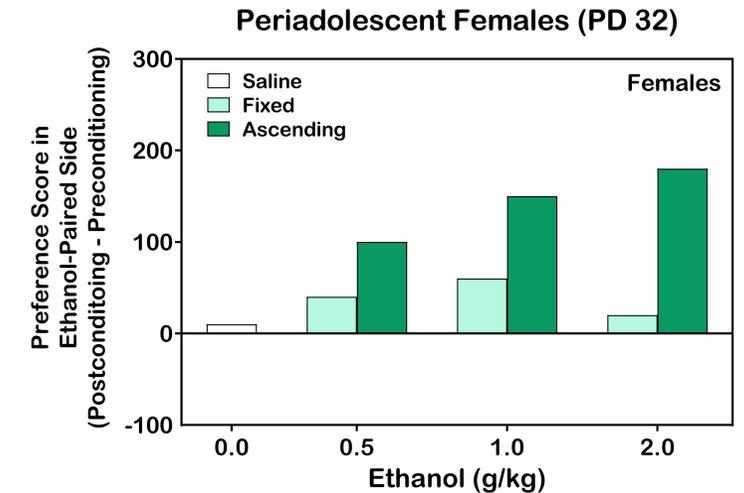
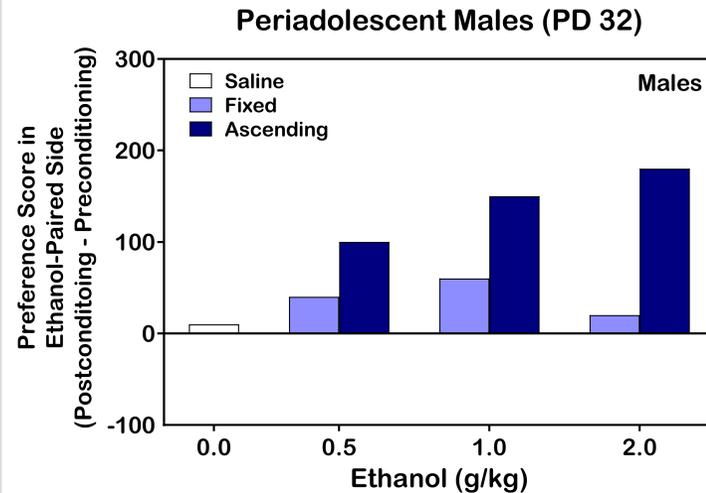
- ❖ **Experiment 1:** *Fixed dosing pattern** or *ascending dosing pattern** of alcohol on **nonpreferred side (NP)** and **saline** on **preferred side (P)** on alternating days for 15 min sessions.
- ❖ **Experiment 2:** Rats will be assigned to receive **alcohol**, **nicotine***, or **alcohol/nicotine** injections on **NP side** and given **saline** on **P side** on alternating days for 15 min sessions.

POSTCONDITIONING (PD 32):

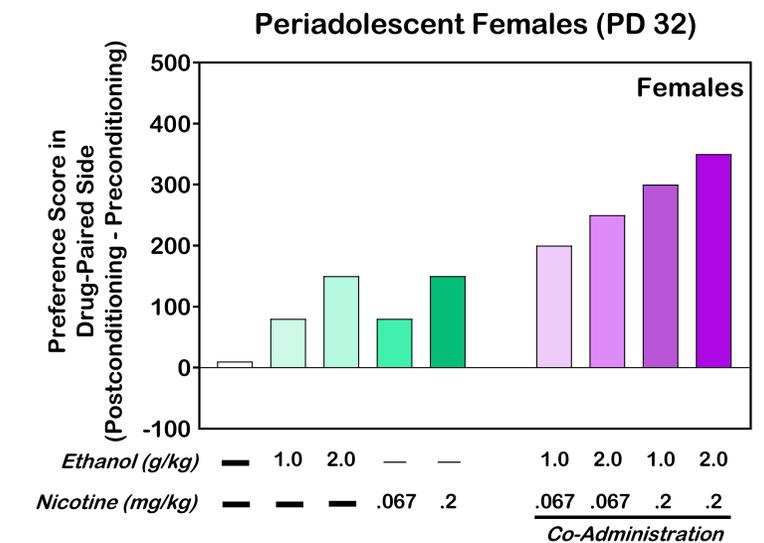
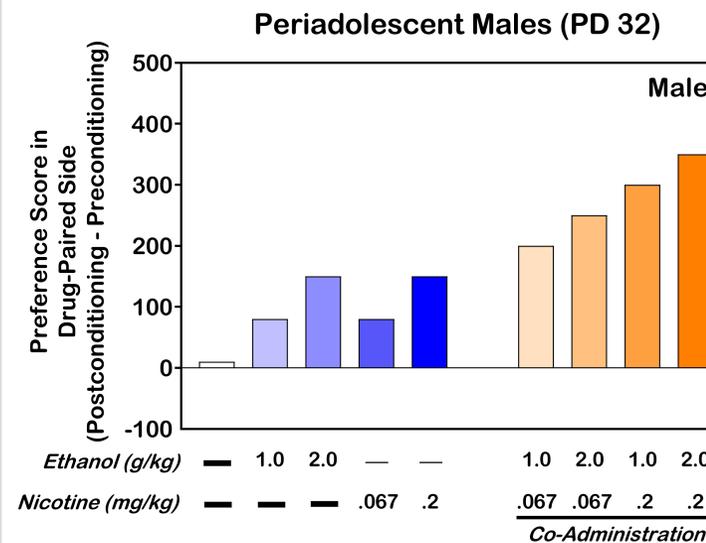
- ❖ Free access to both sides of the CPP apparatus for 15 minutes in a **drug-free state**.
- ❖ CPP is said to occur if there is a significantly higher preference score (postconditioning – preconditioning) in the drug-paired side.



EXPECTED RESULTS:



- ❖ **Figures 1 & 2:** Rats who will be administered ascending doses of alcohol from PD 24-31 will exhibit a more robust alcohol-induced CPP than rats who will be administered fixed doses of alcohol and the saline control.



- ❖ **Figures 3 & 4:** The co-administration of alcohol and nicotine from PD 24-31 will produce a synergistic effect in comparison to if rats are administered alcohol or nicotine independently and the saline control.

POTENTIAL IMPLICATIONS:

- ❖ There is a strong positive correlation between smoking and alcohol, as over 80% of alcoholics have been seen to also smoke (Batel et al., 1995, *Addiction*, 90).
- ❖ Co-use of alcohol and nicotine is higher among younger age groups than older age groups (Falk et al., 2006, *Alcohol Res. Health*, 29).
- ❖ This study will investigate the **concurrent use** of alcohol and nicotine and how they may be affecting the rewarding properties of one another, and we anticipate that this will make their co-use more enjoyable than their individual use.
- ❖ If so, there may potentially be an **increased risk to abuse these drugs** compared to if these substances were taken individually.
- ❖ This information can be utilized to further understand the neurobiological mechanisms that underlie the co-use of alcohol and nicotine in adolescence as well as identify potential therapeutic targets for alcohol and nicotine dependence.

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