The Effects of Cannabidiol on Olfactory Physiological Cue Reactivity in Adolescents with Alcohol Use Disorder

Alison Kong, Brittney D. Browning Ph.D., Elizabeth A. R. Robertson B.A., Samuel O. Agbeh B.A., Lindsay M. Squeglia Ph.D.*, Anna E. Kirkland Ph.D*.
*Co-Senior Authors

BACKGROUND

- Adolescents are at risk for negative developmental effects due to a peak in rates of alcohol use disorder (AUD).[1]
- Cannabidiol (CBD) is a promising candidate pharmacotherapy for AUD due to its broad range of neurobiological targets and safety profile.[1]
- Electrocardiogram (EKG) can be utilized to measure the psychophysiological response to alcohol olfactory cues, through measures such as heart rate variability (HRV).[3]
- HRV is a measure of olfactory cue cravings; higher HRV is correlated with reduced alcoholic cravings.[3]

OBJECTIVE

This study aims to investigate the effects of CBD on olfactory physiological cue reactivity in adolescents with AUD using a double-blind randomized crossover design.

METHODS

Non-treatment seeking youth (ages 18-22) were recruited based on the following:
•Met criteria for AUD in the past year
•≥1 continued AUD symptom(s) in the past 30 days
•Used alcohol within the last 14 days
•No CBD use in the last 18 days
•No daily cannabis use

CBD (600 mg) or matched-placebo were acutely administered with an 18-day washout period. Participants were asked to sniff water followed by apple juice and their favorite alcoholic beverage in a randomized order. EKG was utilized to measure four HRV measures (see Figure 1).

Mixed linear models with a random effect of participant were used to assess the effects
1. Medication (CBD or placebo)
2. Cues (Water, Apple Juice, Alcohol)
3. Medication*Cue

RESULTS

Table 1. Participant Demographics (*N*= 23)

Age (mean [SD])	20.5 (1.5)
Female (n[%])	13 (56.5%)
Past Year AUD Criteria (n[%])	
• Mild	12 (52%)
• Moderate	7(30%)
• Severe	4(18%)

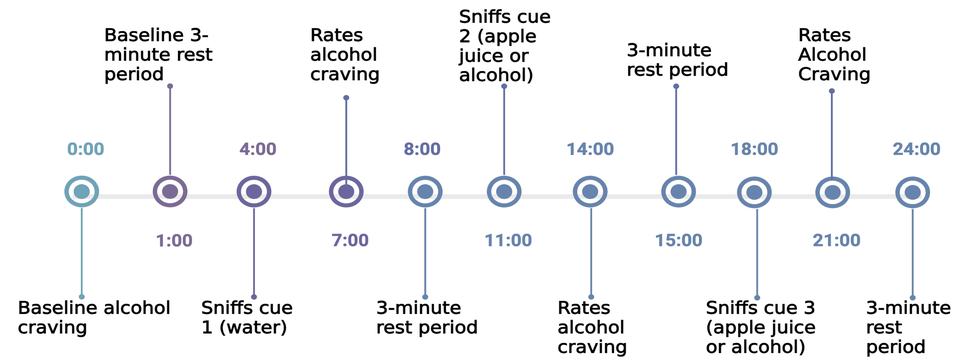

Figure 1. Reactivity Task Timeline (mins)

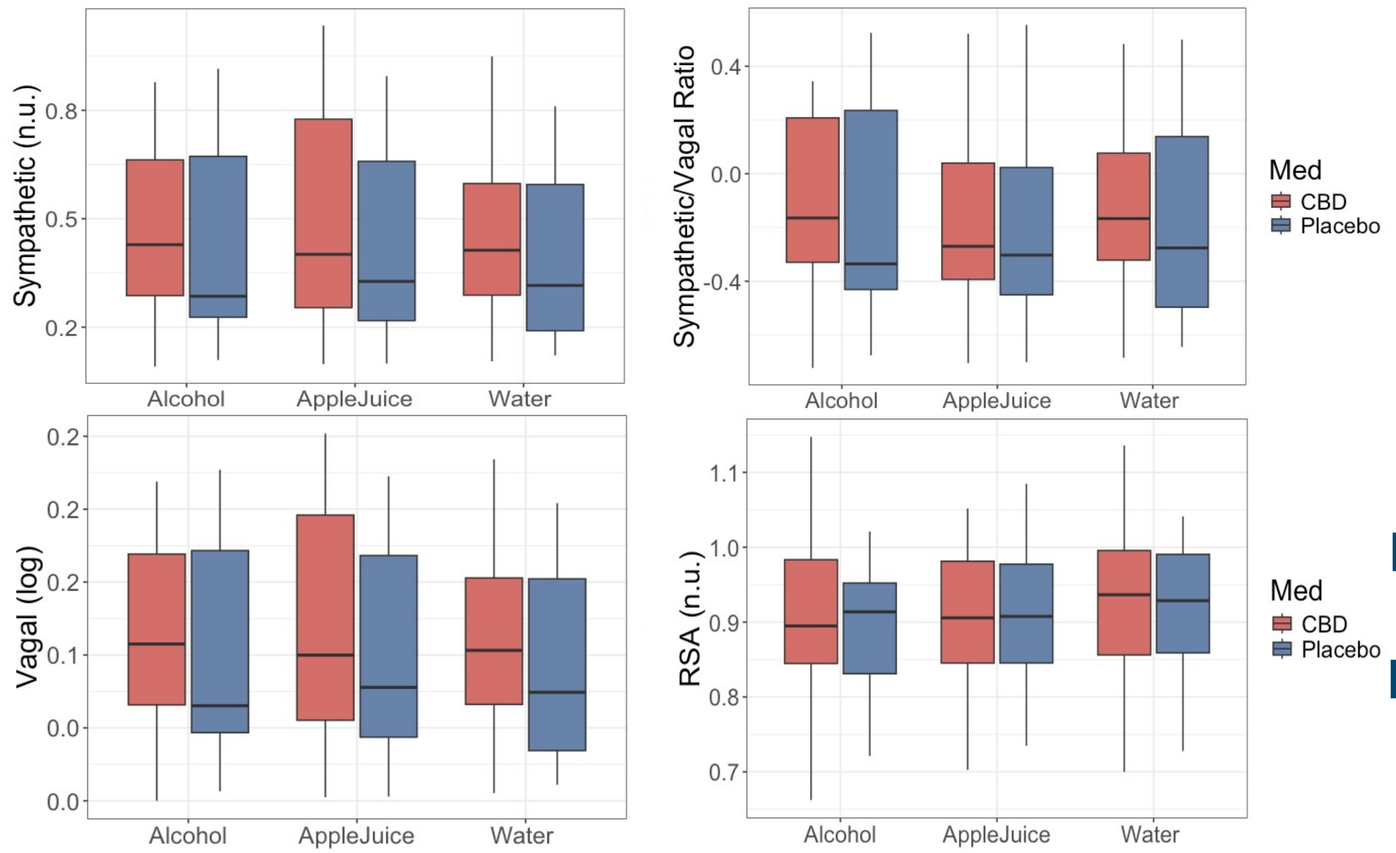

Figure 2. Medication*cue interactions across the four HRV measures including sympathetic and vagal activities, their ratio, and respiratory sinus arrythmia (RSA). No significant differences were found across all measures.

CONCLUSIONS

- No significant HRV differences were noted between medication, cues, or medication*cue (*p*'s > 0.05).
- No differences in HRV between the alcohol and apple juice cues were found, indicating that the olfactory cues presented generated no significant HRV response.
- CBD had no detectable effects on physiological reactivity to olfactory cues in this study based on HRV.
- The fact that there was no significant HRV difference between the alcohol and non-alcohol olfactory cues does not imply that CBD plays no effect on olfactory physiological cue reactivity.

FUTURE DIRECTIONS

- This study provides valuable insights on the effects of CBD on olfactory-based cravings in adolescents with AUD, as well as the limitations of the alcohol olfactory task as a proxy for craving in this sample.
- Although no significant differences were found in HRV, other measures taken during the task must be considered: subjective cravings, skin conductivity, and respiration rates.
- The additional measures collected during this task will provide better insight to determine the effects of CBD on olfactory physiological cue reactivity in adolescents with AUD.

ACKNOWLEDGEMENTS

This work was supported in part by R25 DA020537 and R21 AA030114 (PI: Squeglia).

REFERENCES

1. Kirkland, A. E., Fadus, M. C., Gruber, S. A., Gray, K. M., Wilens, T. E., & Squeglia, L. M. (2022). A scoping review of the use of cannabidiol in psychiatric disorders. *Psychiatry research*, *308*, 114347.
2. Thomas, S. E., Drobes, D. J., & Deas, D. (2005). Alcohol cue reactivity in alcohol-dependent adolescents. *Journal of Studies on Alcohol*, *66*(3), 354–360.
3. Quintana, D. S., Guastella, A. J., McGregor, I. S., Hickie, I. B., & Kemp, A. H. (2013). Heart rate variability predicts alcohol craving in alcohol dependent outpatients: Further evidence for HRV as a psychophysiological marker of self-regulation. *Drug and Alcohol Dependence*, *132*(1-2), 395–398.