



Potential Anxiolytic Effects of Cannabidiol (CBD) using Voluntary Oral Consumption in Rats

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Introduction

Cannabidiol (CBD) is one of many cannabinoids derived from the plant, *Cannabis Sativa*. Unlike tetrahydrocannabinol (THC), CBD is not known to be psychoactive, but has been shown to be an effective treatment of epilepsy, and an anxiolytic.

- The effects of CBD have been observed in children with Dravet syndrome (Devinsky et al. 2017) revealing a reduction in seizures following receiving a 20 mg/kg chronic oral dose of CBD.
- Blessing et al. (2015) reviewed experiments with rats receiving CBD injections that revealed a reduction in anxiety-like behavior on an elevated plus maze.
- There is little research on the effect of oral CBD administration in animals.
- The Agriculture Improvement Act of 2018 legalized production and purchase of CBD with less than .3% THC, leading to an explosion of commercial oral use of CBD products.

The current experiment evaluated whether CBD has an anxiolytic effect when being voluntarily consumed 12 days prior to testing.

- It was expected that CBD rats would spend more time in the open arms of the elevated plus maze, the center of the open field, and the light side of the open field compared to the control group (Water). It was also hypothesized that CBD rats would turn the running wheel more times than Water rats.

Method

Elevated plus maze
(5 – min)

Running Wheel
(30- min)

Open Field
Center vs. Outer
(5 – min)

Open Field
Light vs. Dark
(5 – min)



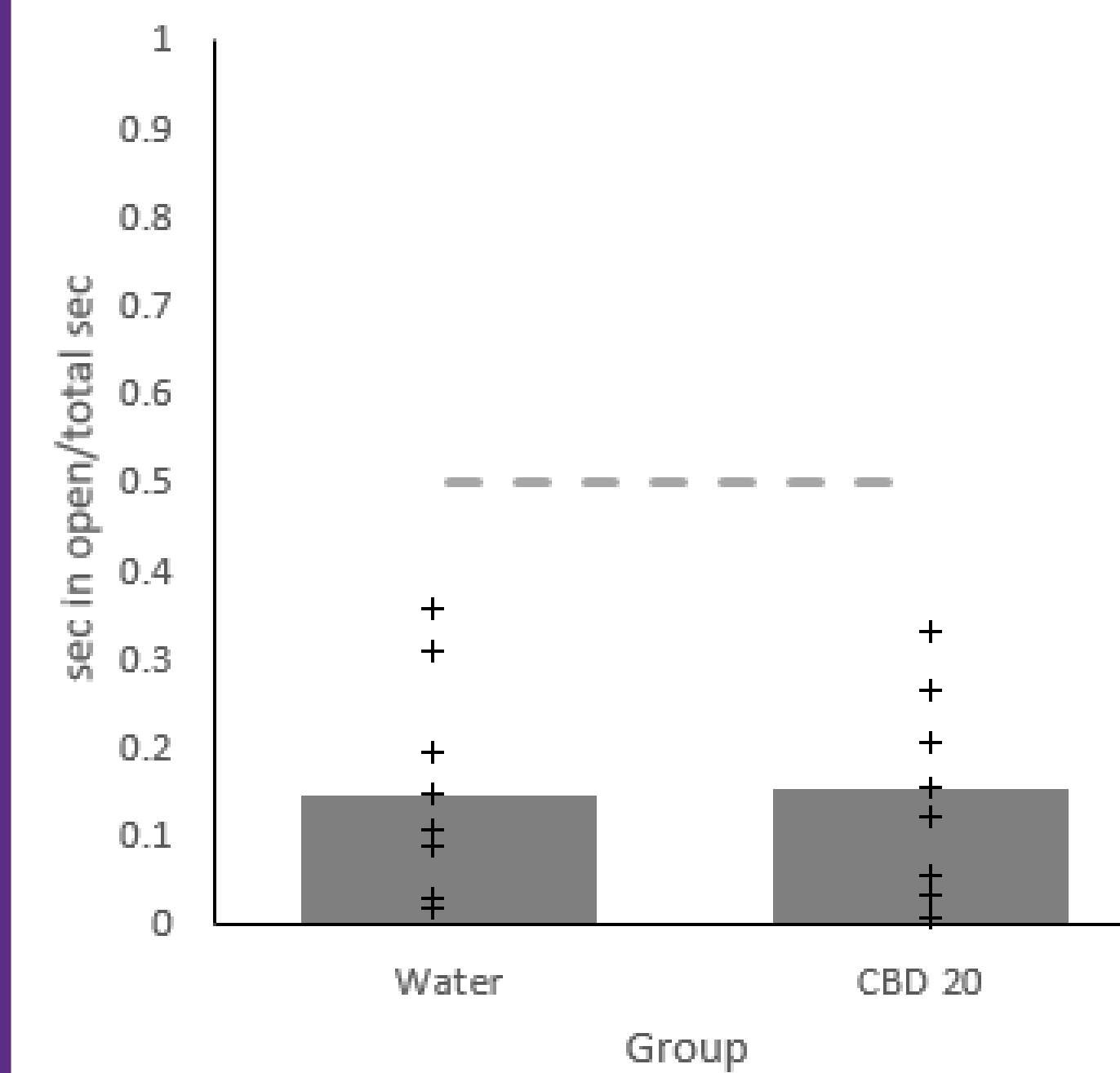
Exp	n	Dosage	Type of test	Fed
1	16	0 vs. 20 mg/kg	Chronic (12 days)	2 hours prior to test

Anxiety Measure:

- Elevated Plus Maze – seconds spent on open arms/total seconds
- Running Wheel – number of wheel turns
- Open Field Center vs. Outer – seconds spent on center/total seconds
- Open Field Light vs. Dark – seconds spent on light area/total seconds

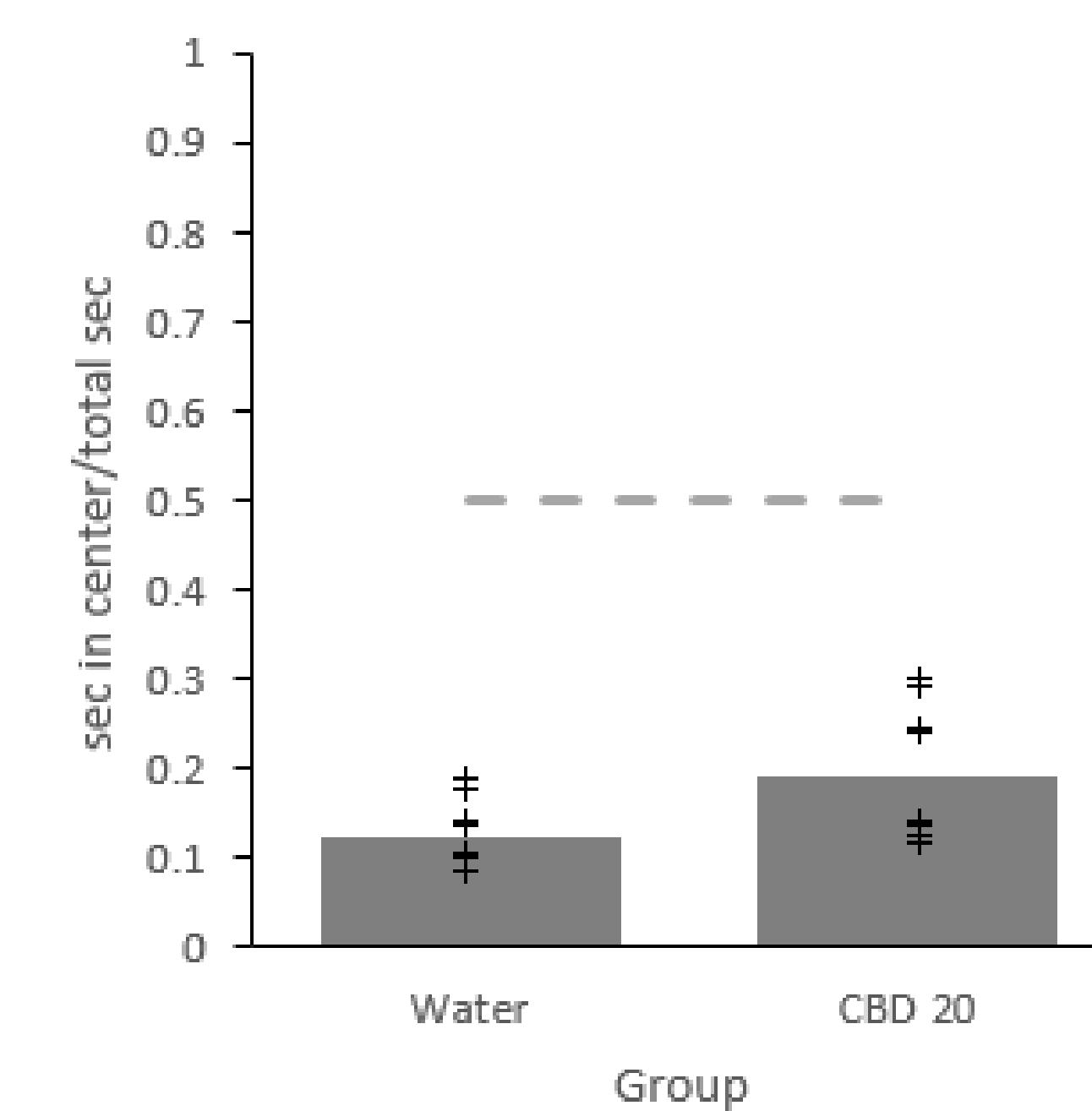
Results

Elevated Plus Maze



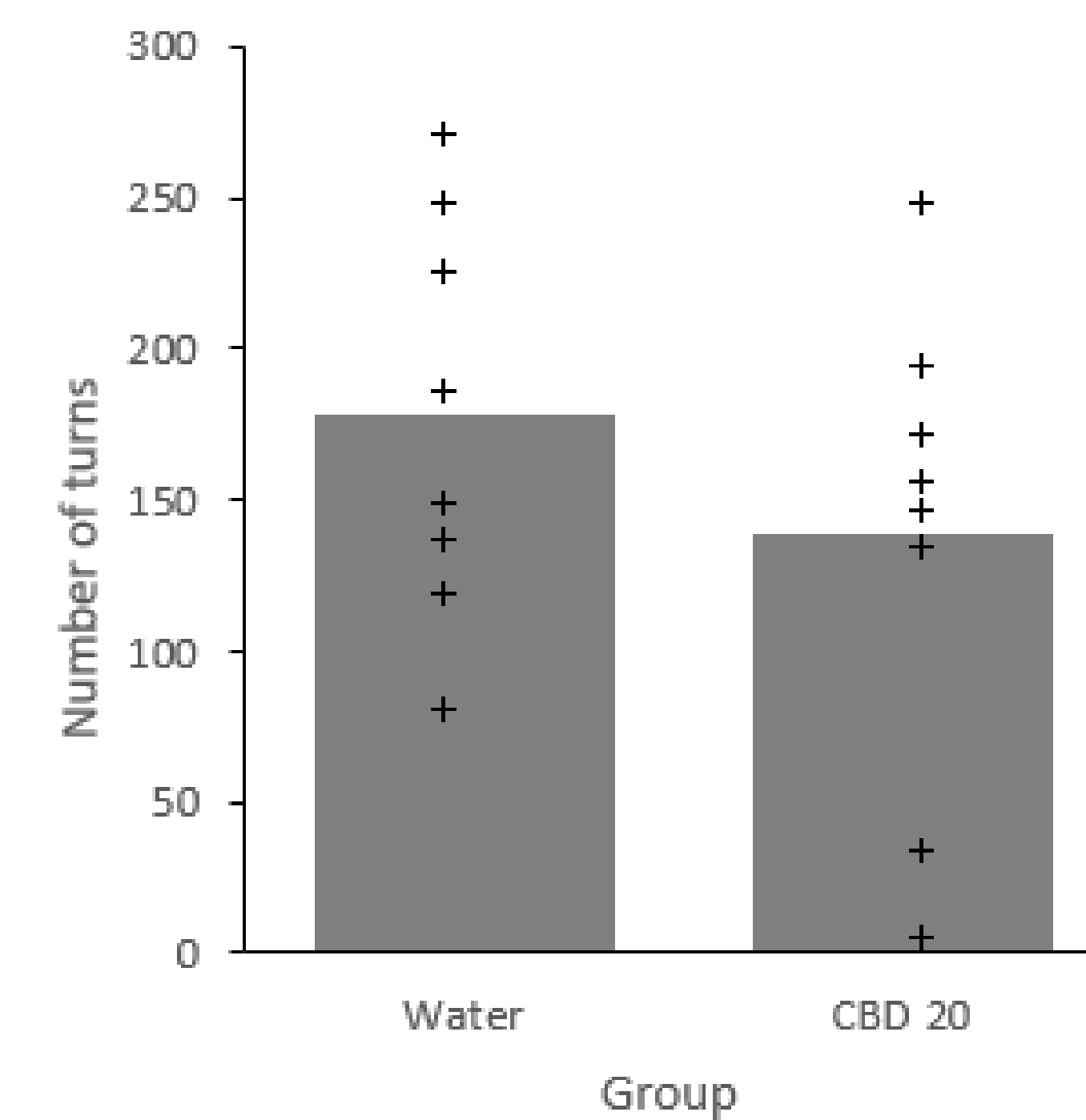
A one-way ANOVA revealed no significant main effect of Group, $F(1, 14) = .03, p = .87$. Single-samples t -tests conducted on the ratio on each group revealed a significant difference from .5, indicating a preference for the closed arms in both groups, $ps \leq .001$.

Open Field Center vs. Outer



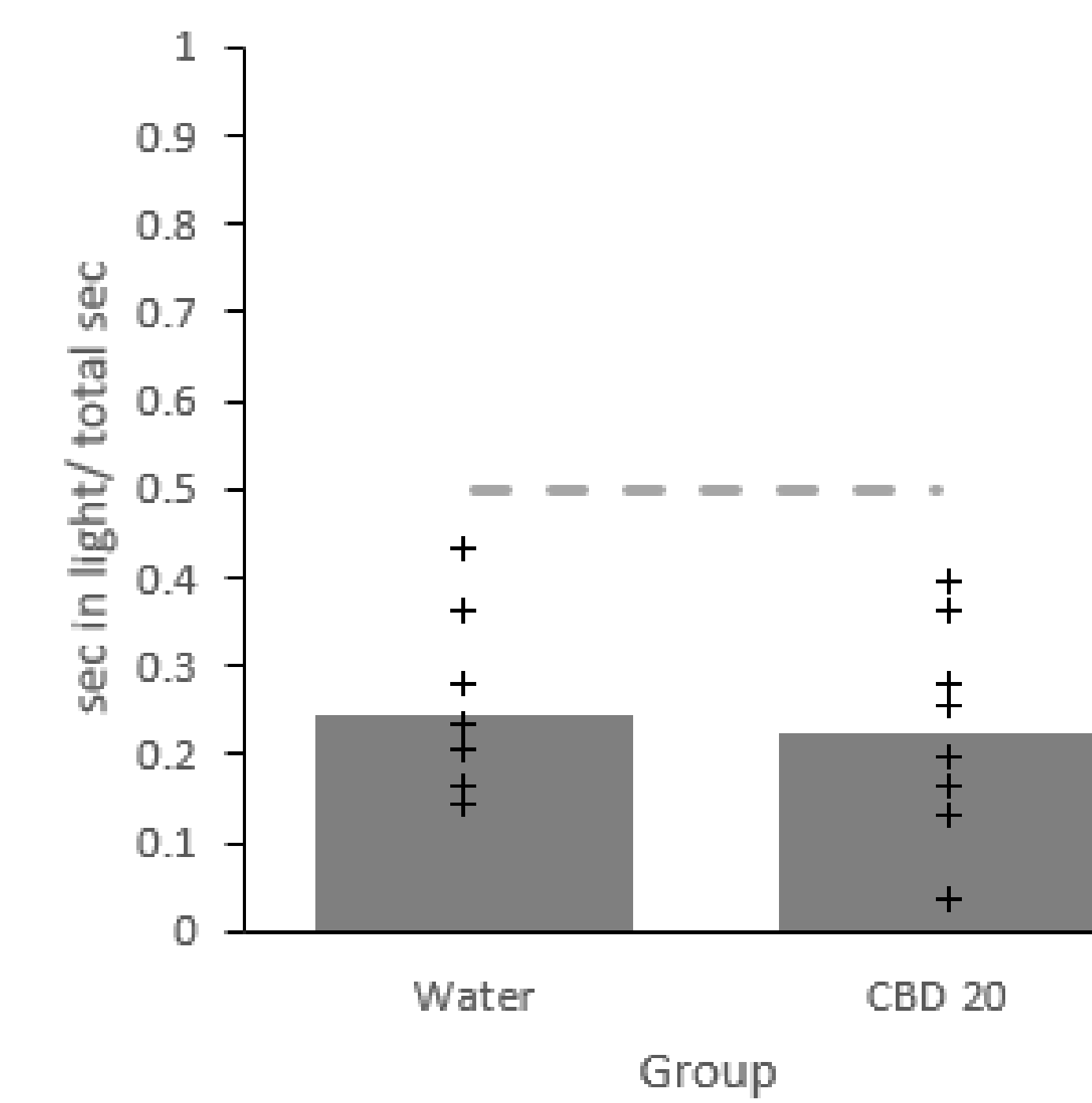
A one-way ANOVA revealed a significant main effect of Group, $F(1, 14) = 5.07, p = .04$. With the CBD group being in the open arms more than the Water group. A single-samples t -test conducted on the ratio against chance (.5) in each group revealed a preference for the outer area in both groups, $ps \leq .001$.

Running Wheel



A one-way ANOVA revealed no main effect of Group, $F(1, 14) = 1.20, p = .29$.

Open Field Light vs. Dark



A one-way ANOVA revealed no main effect of Group, $F(1, 14) = .11, p = .74$. Single-samples t -tests were conducted on the ratio in each group. Both CBD and Water groups were significantly different from chance, $ps \leq .001$, indicating a preference for the dark part of the open field.

Discussion

- A significant difference between groups was found when observing the time spent in the center of an open field apparatus. It appeared that rats that received CBD 20 mg/kg spent more time in the center than those that received a water control. However, both groups still preferred the outer areas of the open field. All other tests yielded no significant group effects.
- We plan to continue to alter the concentration of CBD, as well as experiment with using a CBD isolate that could be dissolved in oils other than coconut oil (i.e. olive, hemp seed, or flax seed oil). It also may be necessary to evoke anxiety in order to observe any anxiolytic CBD effect.

References

- Blessing, E. M., Steenkamp, M. M., Manzanares, J., & Marmar, C. R. (2015). Cannabidiol as a Potential Treatment for Anxiety Disorders. *Neurotherapeutics: the journal of the American Society for Experimental NeuroTherapeutics*, 12(4), 825–836. <https://doi.org/10.1007/s13311-015-0387-1>
- Devinsky, O., Cross, J. H., & Wright, S. (2017). Trial of Cannabidiol for Drug-Resistant Seizures in the Dravet Syndrome. *The New England journal of medicine*, 377(7), 699–700. <https://doi.org/10.1056/NEJMc1708349>