Alcohol and Cannabis: Effects on Serotonin Levels

Group Name: JAM
Group # 13

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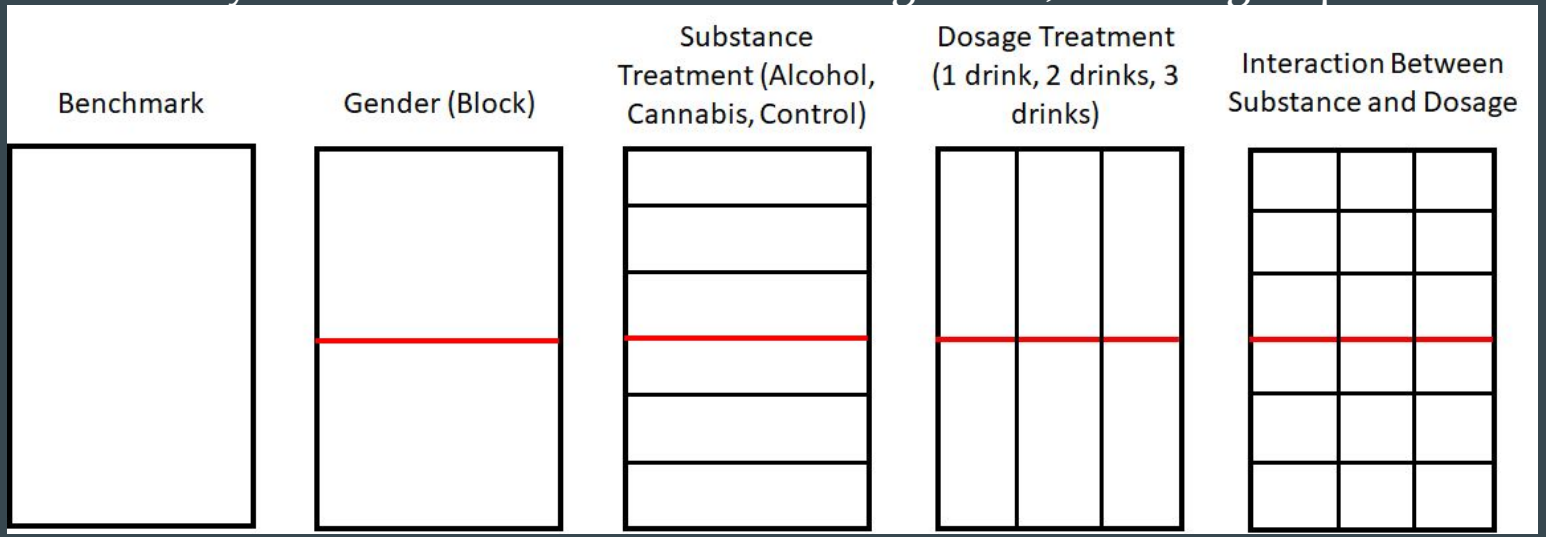
Research Questions & Our Approach to Answering Them

- Is alcohol and cannabis usage an effective coping mechanism among college-aged individuals?
- Do these substances actually increase serotonin levels or do they generally worsen mental states?
- Or is it simply the idea that intaking these substances will make us feel better that is what influences our mental/emotional state?
- Are there any differences in the effects of alcohol and cannabis on serotonin levels compared to herbal tea?
- Can these substances actually help treat negative emotions if not abused and taken at a moderate rate?

- We used ANOVA to determine whether or not our results were statistically significant
- We also used residual plots to determine model validity

Design

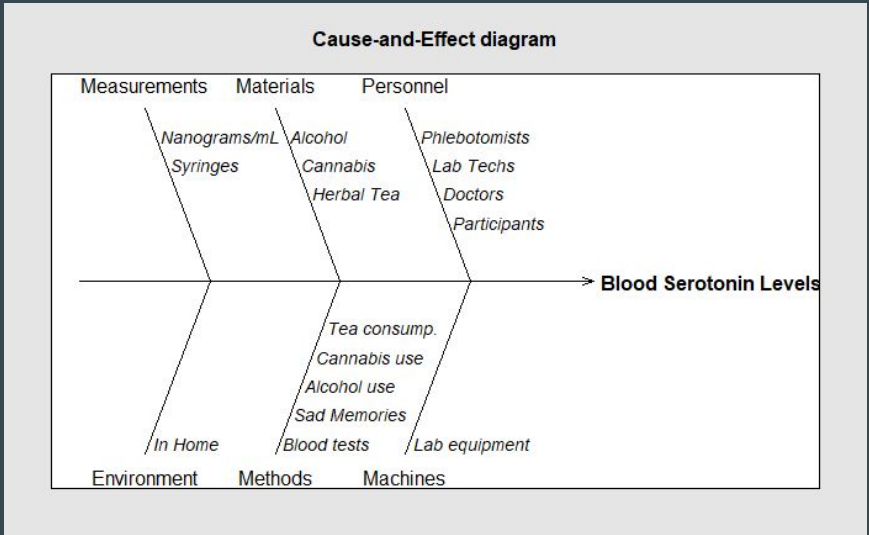
- Two-way basic factorial with one blocking factor, 18 total groups



- We chose this design because we felt that it was the best way to account for each individual treatment based on our blocking factor

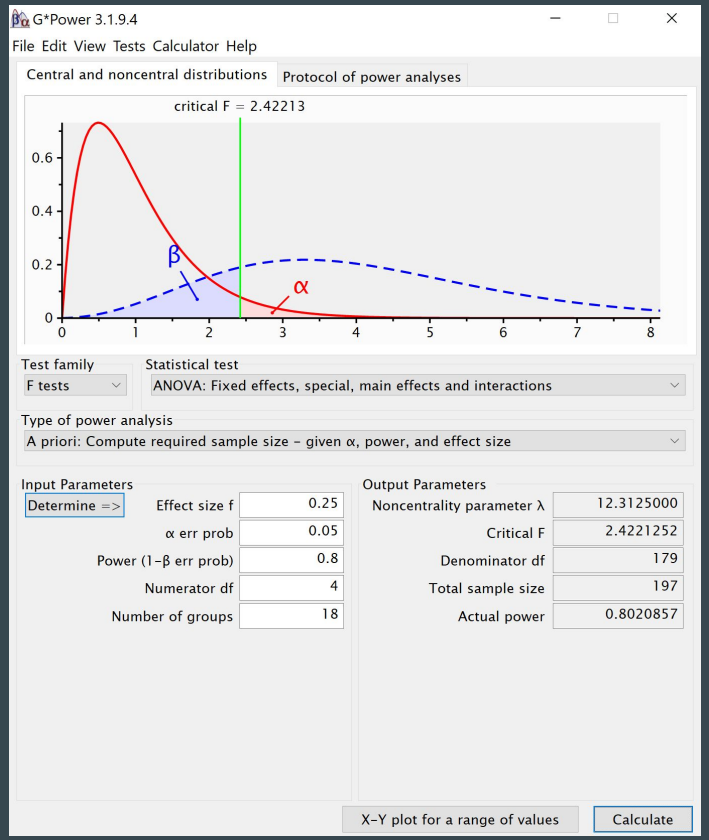
Controlled vs. Uncontrolled Factors

- College-aged, 18-24 years old
- Healthy individuals
  - no diabetes, no asthma
- Gender
  - different serotonin levels
  - different alcohol and cannabis tolerance levels
- Every participant shown/given sad memories
- Prior history of substance use
- Mental/emotional state prior to sad memories task
- Genetics



Sample Size & Power

- Used Gpower to calculate a sample size of 197 for a two-way basic factorial design with one blocking factor
- Rounded to 198 individuals for a balanced design
- Power=0.8

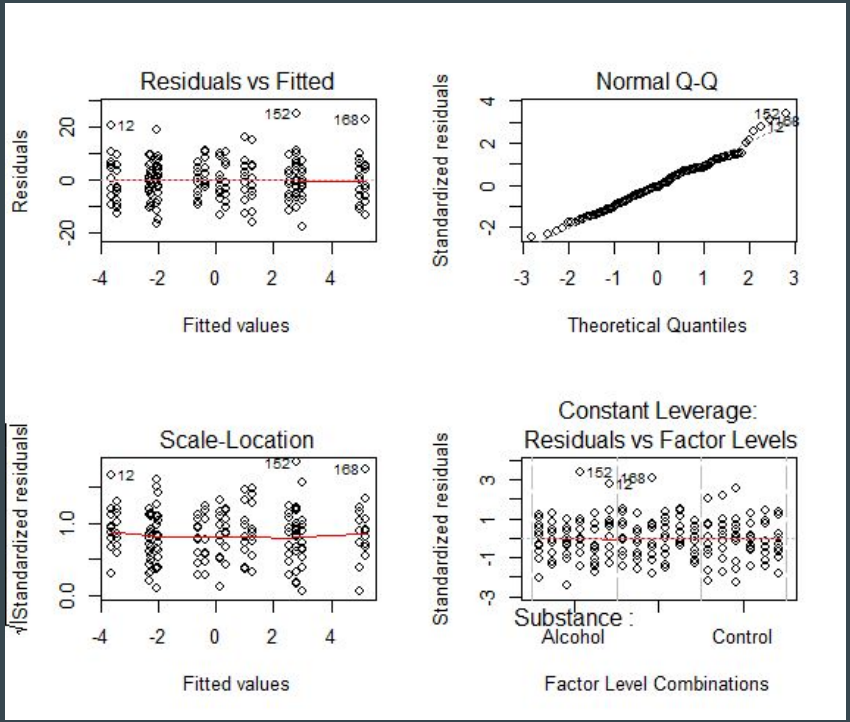


Data Collection

- Collected a diverse sample of people from the largest city on the island, Macondo
  - 99 females
  - 99 males
- Used random assignment to place each participant into a treatment group
- Had each individual relive sad memories for one minute and then measured their serotonin levels shortly after

- Assign participants the task of drinking the number doses of alcohol, cannabis, or herbal tea depending on their randomly assigned treatment group
- Wait approximately 40 minutes for substances to settle
- Measured after serotonin levels

Results, Conclusions, & Future Research Questions

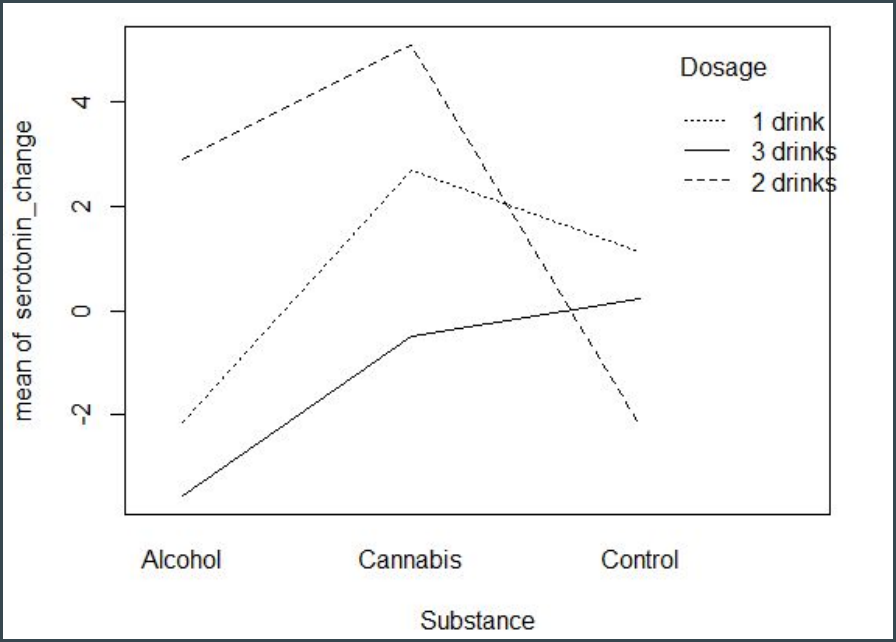


AOV Summary Output

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Substance	2	416.030303	208.015152	3.6375046	0.0281871
Dosage	2	342.757576	171.378788	2.9968544	0.0523358
Sex	1	2.671717	2.671717	0.0467196	0.8291074
Substance:Dosage	4	639.393939	159.848485	2.7952271	0.0274967
Residuals	188	10751.010101	57.186224	NA	NA

Looking at the diagnostic plots, we see that the assumptions of the Randomized Complete Blocking, Two-Way Effects Model are fairly well met. Looking at the p-values, the Substance Factor and Substance:Dosage Factor are the only statistically significant terms in the model.

Results, Conclusions, & Future Research Questions



The interaction plot conveys a clear trend between Alcohol and Cannabis across all Dosage levels, yet the results vary for the Control group (Herbal Tea) depending on the Dosage level

Results, Conclusions, & Future Research Questions

Substance Effects Model

Alcohol	Cannabis	Control
-1.333	2.015	-0.682

Dosage Effects Model

One_drink	Two_drinks	Three_drinks
0.152	1.53	-1.682

Sex Effects Model

Female	Male
0.116	-0.116

Substance:Dosage Effects Model

	One_drink	Two_drinks	Three_drinks
Alcohol	-1.364	2.303	-0.939
Cannabis	0.106	1.136	-1.242
Control	1.258	-3.439	2.182

Tukey HSD 95% Confidence Intervals

	diff	lwr	upr	p adj
Cannabis-Alcohol	3.3484848	0.2385810	6.4583887	0.0314564
Control-Alcohol	0.6515152	-2.4583887	3.7614190	0.8738216
Control-Cannabis	-2.6969697	-5.8068735	0.4129342	0.1035834
2 drinks-1 drink	1.3787879	-1.7311160	4.4886917	0.5479859
3 drinks-1 drink	-1.8333333	-4.9432372	1.2765705	0.3467748
3 drinks-2 drinks	-3.2121212	-6.3220251	-0.1022174	0.0411506
Male-Female	-0.2323232	-2.3526165	1.8879701	0.8291074

Here, we see the results of the Effects Model (the Tau's) on the left, and the Tukey HSD 95% Confidence Intervals Above. The mean's of Cannabis and Alcohol are significantly different from each other.

Results, Conclusions, & Future Research Questions

Future Research Questions

- Is Herbal Tea a true “placebo”?
- How do other substances besides alcohol and cannabis affect serotonin levels when in a depressed state?
- What other measurements can we use besides serotonin levels as a means to ‘cope’ with depression?