Cannabis Potency, Cannabis Dependence and Anxiety Where Does Gender Fit In?

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Background

THC:CBD Ratios in Cannabis

- Δ9 -tetrahydrocannabinol (THC) potency increasing, Cannabidiol (CBD) potency remaining relatively stable over the past ~5 decades in Canada
- Higher THC cannabis is associated with higher severity of cannabis dependence and may exacerbate symptoms of anxiety
- CBD may attenuate the anxiogenic effects of THC and improve anxiety symptoms
- **High THC:Low CBD →** highest likelihood of cannabis dependence development and anxiety exacerbation

Men vs. Women Cannabis Use

- Typically, males have higher prevalence of cannabis use, higher prevalence of cannabis use disorder (CUD), and higher severity of CUD
- Women have shown higher anxiety levels than men with the same dose of THC
- **Gender Convergence:** However, evidence in more recent cohorts have suggested the convergence of cannabis use behaviors between men and women across multiple data types (Kerr et al., 2007; Chapman et al., 2017; UNDOC; 2022; Bernusky et al., 2023)

Mathematical Issues with Potency Calculation

- **THC:CBD Ratio →** THC/CBD = potential for creating missing values for the theoretically riskiest cannabis users (ie. Those who report CBD percentages as 0)
- **THC Proportion →** THC/(THC+CBD), creates a value between 0.000-1.000 without risk of data loss.

Methods

Participants

- N = 202 adults (43.6% men, 98% sex-gender aligned, *M* age = 42.94 years)
- Inclusion: between the ages 19-65, experienced at least one potentially traumatic event (LEC-5; Gray et al., 2004), and use 1+ gram of cannabis per week.

Materials

- THC/CBD → author compiled self-report measure assessed aspects of typical cannabis use including THC/CBD concentrations.
- Cannabis Use Disorder Identification Test-Revised (CUDIT-R; Adamson et al., 2010)
- Generalized Anxiety Disorder-7 (GAD-7; Spitzer et al., 2006)

Procedure

- Participants were invited through Qualtrics recruitment to participate in a Mental Health Commission of Canada (MHCC)--funded study
- Participants who met inclusion criteria completed the author-compiled measure to assess THC/CBD concentrations, the CUDIT-R, and GAD-7 to assess their cannabis dependence and anxiety levels.

Study Design → Bivariate correlations were used to analyze the relationship between cannabis potencies (THC%, CBD%, THC:CBD Ratio, and THC Proportion) with total CUDIT-R and GAD-7 scores.

- Independent T-tests were conducted to compare THC%, CBD%, THC:CBD Ratio,. THC Proportion, CUDIT-R , and GAD-7 across men and women.
- Correlations were compared across the whole sample, then by gender, using Fisher's R-Z transformation to assess the significant differences.

Purpose & Hypotheses

Purpose: examine the relationships between proportions of THC: CBD in cannabis used by trauma-exposed regular cannabis users and their current levels of cannabis dependence and anxiety levels and examine if these relationships vary by gender.

H1: Higher THC% and cannabis potency ←→ greater anxiety and cannabis dependence levels.
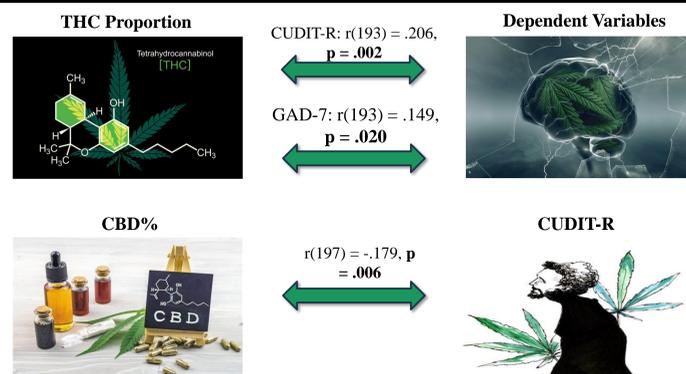**H2:** Higher CBD ←→ lower anxiety and cannabis dependence levels
H3: Male > Female sex differences in cannabis potencies and proportions, and cannabis dependence levels, Female < Male sex differences in anxiety levels
H4: Female > Male in cannabis potency effects on anxiety, explored if this gender moderation extends to cannabis potency effects on cannabis dependence.
H5: THC proportion (THC/THC+CBD) will be a better predictor than THC:CBD ratio (THC/CBD)

Results

THC Proportion — CUDIT-R: r(193) = .206, **p = .002** — Dependent Variables

GAD-7: r(193) = .149, **p = .020**

CBD% — r(197) = -.179, **p = .006** — CUDIT-R

Males
THC:CBD = **9.63**
THC Prop = **.68**
CUDIT-R Total = **12.15**
GAD-7 Total = **7.73**

Females
THC:CBD = **23.09***
THC Prop = **.70**
CUDIT-R Total = **10.80**
GAD-7 Total = **9.55***

Relationship	Men (n = 88)		Women (n = 111)		Fisher's R-Z	
	r	p	r	p	Z	p
1. THC Prop – CUDIT-R	.229	.016*	.196	.023*	1.08	.140
2. THC Prop – GAD-7	.230	.016*	.075	.225	.24	.410
3. THC:CBD – CUDIT-R	.085	.231	-.012	.455	1.56	.059
4. THC:CBD-GAD-7	.120	.149	-.044	.399	1.04	.149

Discussion

Key Findings

- **H1:** Only THC Proportion was associated with significantly higher cannabis dependence and anxiety levels.
- **H2:** CBD% alone only related to significantly lower cannabis dependence levels
- **H3:** Women showed significantly higher THC:CBD ratios and anxiety scores compared to men
- **H4:** All relationships between cannabis potency measures, cannabis dependence, and anxiety levels did not differ by gender
- **H5:** More significant relationships were found using THC proportion as the potency measure than THC:CBD ratio

- Results are consistent with a gender convergence of previously reported differences in cannabis dependence levels amongst regular cannabis users.
- Results also point to the importance of THC potency as a risk factor for both men and women, as well as the potential benefit of using THC proportion as a measure of potency vs. THC:CBD ratio.

Limitations & Future Directions

- **Cross-Sectional Design:** cannot determine the causal direction in the relationship between THC proportion and cannabis dependence/anxiety levels.
- **Lack of Gender Diversity:** only three individuals self-reported that they were non-binary or transgender and couldn't differentiate sex vs gender effects. Additional studies with more non-binary and/or gender non-conforming individuals could make the research more relevant to individuals whose sex and gender identity diverge.
- **THC-CBD measure:** reliability/validity of the author-compiled questionnaire to assess THC/CBD in participant cannabis use was not evaluated before inclusion in the survey. Additional reliability and validity testing should be conducted in future studies to determine the scale's suitability for inclusion in future projects.
- **Gender Moderation:** no formal moderation analysis was conducted, which could be explored further in a secondary analysis.
- **Generalizability:** all individuals examined were trauma-exposed regular cannabis users; additional studies are needed to determine if these results generalize to non-trauma-exposed or occasional cannabis users.

References

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