# Budding Recursive Partitioning Trees to Identify Predictors of Cannabis-Related Outcomes

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## Introduction

- Personality traits (Galbraith & Connor, 2015), normative perceptions (Pearson et al., 2017), cannabis use motives (Moitra et al., 2015), and use of protective behavioral strategies (PBS; Pedersen et al., 2016) have been identified as predictors of cannabis use, negative cannabis-related consequences, and cannabis use disorder (CUD) symptom severity
- These studies are focused on a narrow set of predictors and utilize linear models
- Exploratory research considering the combination of multiple independent variables to understand their predictive value in explaining cannabis user status, negative cannabis-related consequences, and CUD symptoms is merited
- The study aims to apply recursive partitioning to identify predictors of cannabis user status, negative cannabis-related consequences, and CUD symptoms among college students

## Method

### PARTICIPANTS

- College students (n=7000; 66.8% female, 39.5% non-White) were recruited from nine universities in nine states across the U.S.
- 57.3% of participants reported lifetime cannabis use and 52.5% reported past 30-day cannabis use
- Participants reported experiencing an average of 3.64 (SD=3.90) negative consequences in the past month
- 7.7% to 34.4% of our sample were determined to have a probable CUD based on cutoff scores for each CUD symptom measure

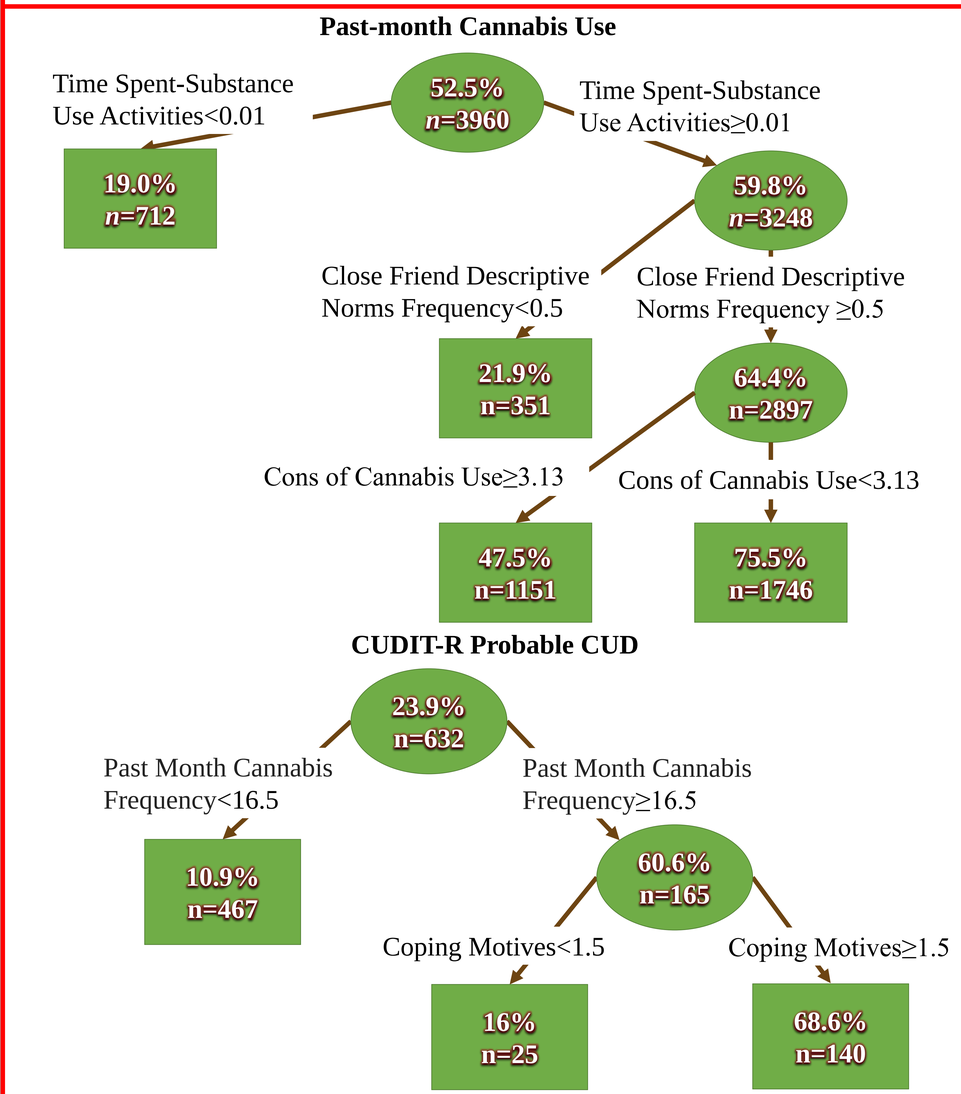
### MEASURES

- Two, dichotomous (yes/no) items were used to assess **lifetime cannabis use** and **past 30-day cannabis use**.
- **Past 30-day negative cannabis-related consequences** were assessed using the 21-item Marijuana Consequences Questionnaire Short Form (MACQ; Simons et al., 2010)
- **Past 30-day CUD symptoms** were assessed using four measures of CUD symptoms: the Self-Reported Symptoms of Cannabis Use Disorder (SRSCUD; Richards et al., 2020), the Cannabis Use Disorder Identification Test-Revised (CUDIT-R; Adamson et al., 2010), the Cannabis Abuse Screening Test (CAST; Legleye et al., 2007), and the Severity of Dependence Scale (SDS; Gossop et al., 1995)

## Analytic Approach

- 155 predictors (40 cannabis use indicators, 115 other psychosocial constructs) were entered into each decision tree model using the 'rpart' package in R
- Model branches that did not improve prediction accuracy in cross-validation (k= 10) were removed or "pruned"
- A complexity parameter of 0.03 was selected for model fitting

## Decision Trees




## Acknowledgements

FJS, RAP, VJW are supported by a training grant (T32-AA018108) from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). DKR is supported by an individual training grant (F32-AA028712) from the NIAAA. MRP is supported by a career development grant (K01-AA023233) from the NIAAA. Poster presented at the Collaborative Perspectives on Addiction Conference, 2021 Virtual Format.

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## Results

- **Ease of obtaining cannabis** and **pros of cannabis** contributed to the final tree predicting lifetime cannabis use; those reporting cannabis "fairly" or "very" easy to obtain, 70.6% reported lifetime use
- **Time engaging in substance use activities, close friends' descriptive norms frequency**, and **cons of cannabis** contributed to the final tree predicting past 30-day cannabis use (see top figure)
- **Typical frequency of cannabis use** was the only variable contributing to the model predicting negative consequences; those using cannabis ≤4 time periods during a typical week reported an average of 2.52 consequences and those using 5+ time periods reported an average of 5.72 consequences
- **Past 30-day cannabis frequency** and **coping motives** contributed to the final tree predicting probable CUD using CUDIT-R (23.9% met cutoff for probable CUD); those using cannabis 17+ days in the past month with moderate to high coping motives had a 68.6% likelihood of meeting the cutoff for probable CUD (see bottom figure)
- Coping motives, past 30-day cannabis frequency, conformity motives, money spent on cannabis, global negative effect expectancies, typical college student injunctive norms quantity, percent time using cannabis alone, typical quantity of cannabis used (grams), and perceived helpfulness of PBS contributed to other CUD symptom models

## Discussion

- Across models, 17 unique predictors were identified
- Consistent with Wilson et al. (2018), predictors of user status were largely related to normative beliefs
- Surprisingly, typical frequency of cannabis use was the only salient predictor of negative cannabis-related consequences
- Negative reinforcement cannabis use motives (i.e., coping and conformity) were the most consistent predictors across models and past 30-day cannabis use appeared to further differentiate CUD symptoms, particularly among individuals with lower levels of negative reinforcement cannabis use motives
- Additional exploratory data analytic techniques might further our understanding of factors that contribute to CUD symptoms
- Machine learning can identify interactions between variables that can serve as CUD intervention targets