

Drug Risk Prediction

15th March 2021

Elias, Melanie, Niels

Agenda

Part 1

- Dataset Characteristics
 - Exploratory Data Analysis
-

Part 2

- Model Building & Evaluation
- Outlook

ILLEGAL DRUGS

5 Depressants | 3 Stimulants | 5 Hallucinogens

Users (*within last 10 years*) | **Non-Users** (*>10 years or never*)

Note: Legal drugs such as legal highs, alcohol, nicotine etc. were not considered in this analysis, apart from methadone.

SOCIO-DEMOGRAPHIC

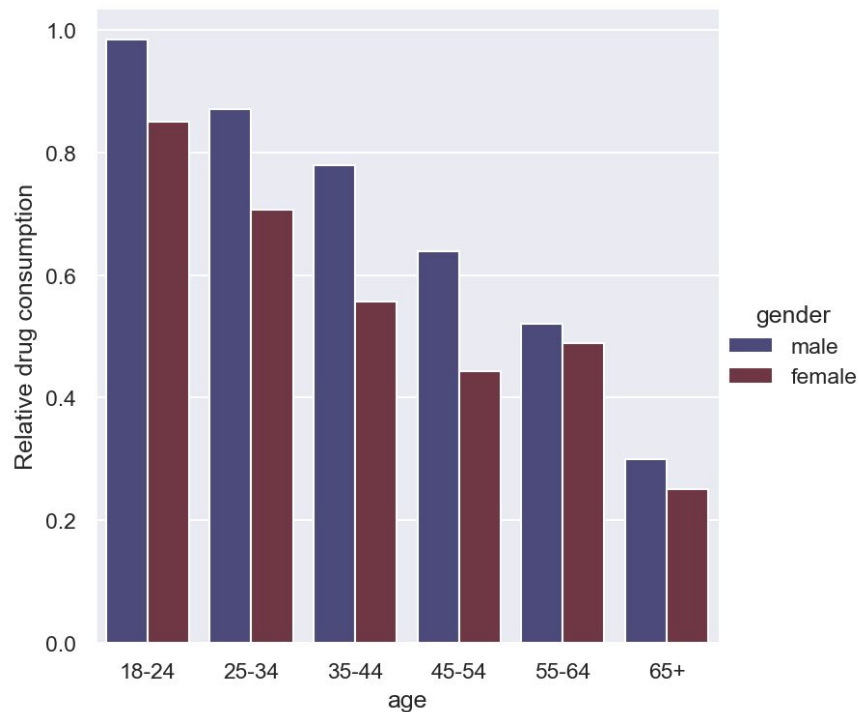
1885 survey participants

- *Age*
- *Gender*
- *Education*
- *Country*
- *Ethnicity*

PERSONALITY

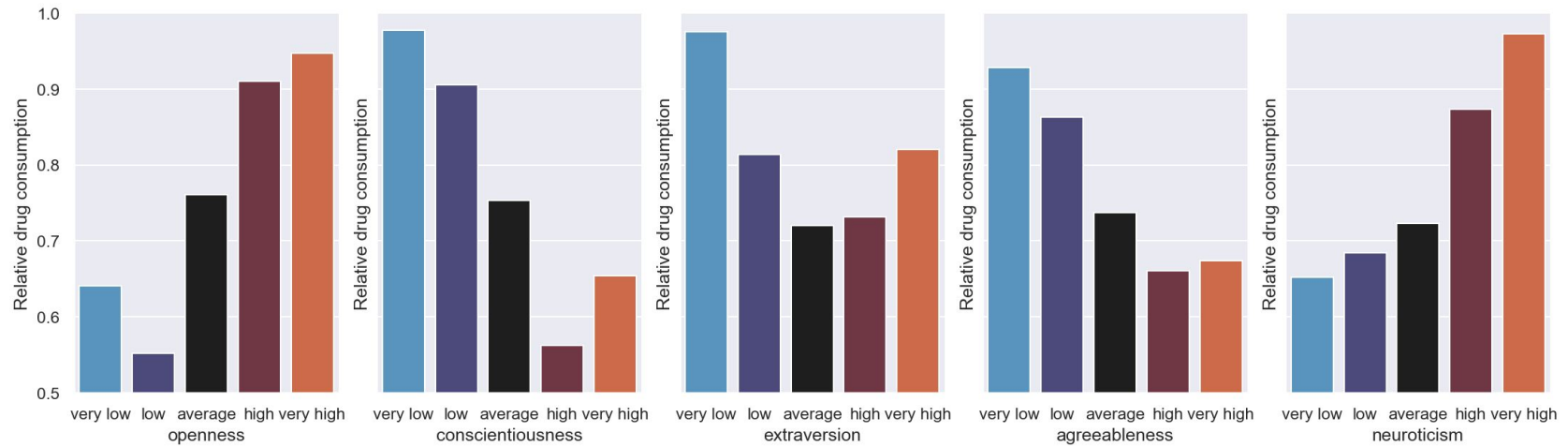
O Openness
C Conscientiousness
E Extraversion
A Agreeableness
N Neuroticism

IMPULSIVENESS
SENSATION SEEKING

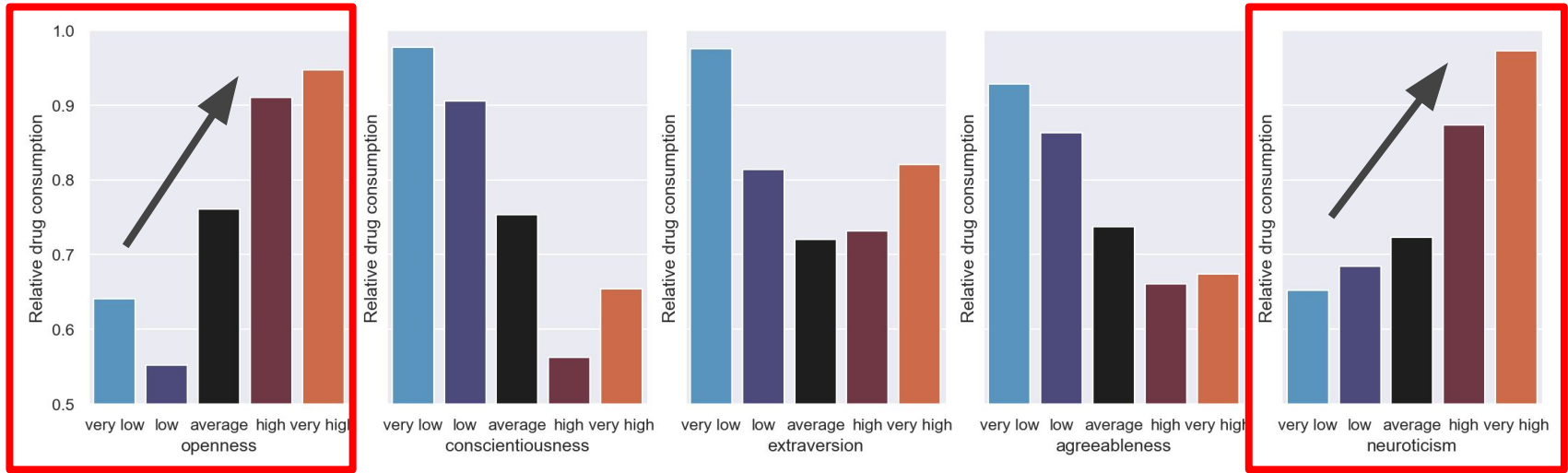


Socio-demographic characteristics of substance abusers

- Higher proportion of young adults abuse drugs compared to the elderly
- Higher proportion of men abuse drugs compared to women
- *No correlation with education*
- *No analysis wrt countries and ethnicities as strong bias towards white Americans/Brits*

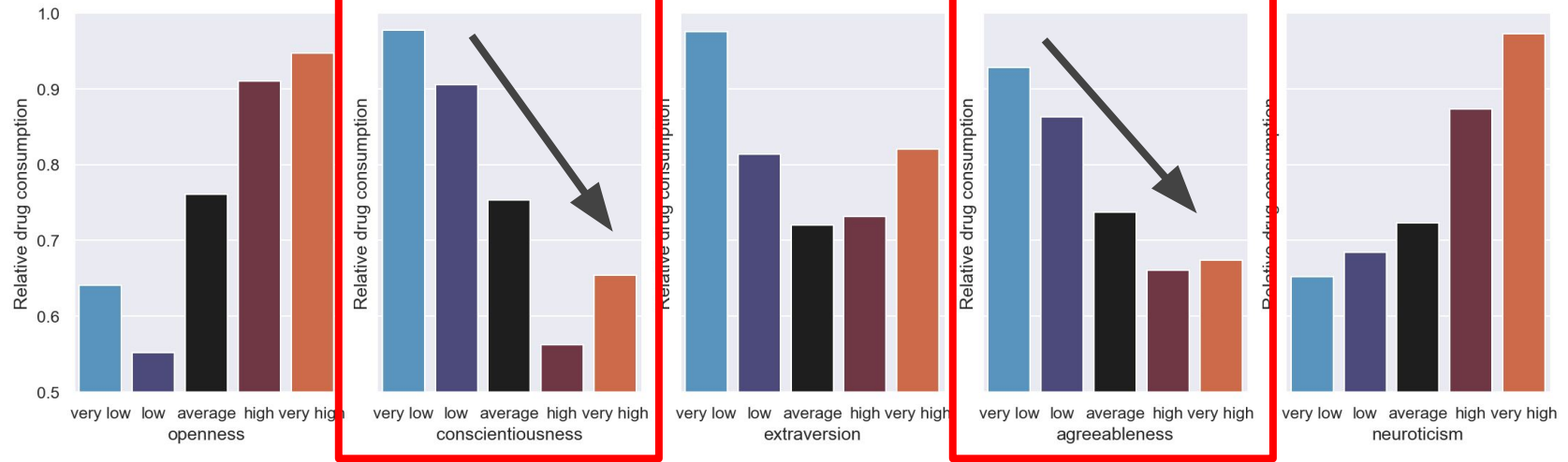


Personality characteristics of substance abusers (1)



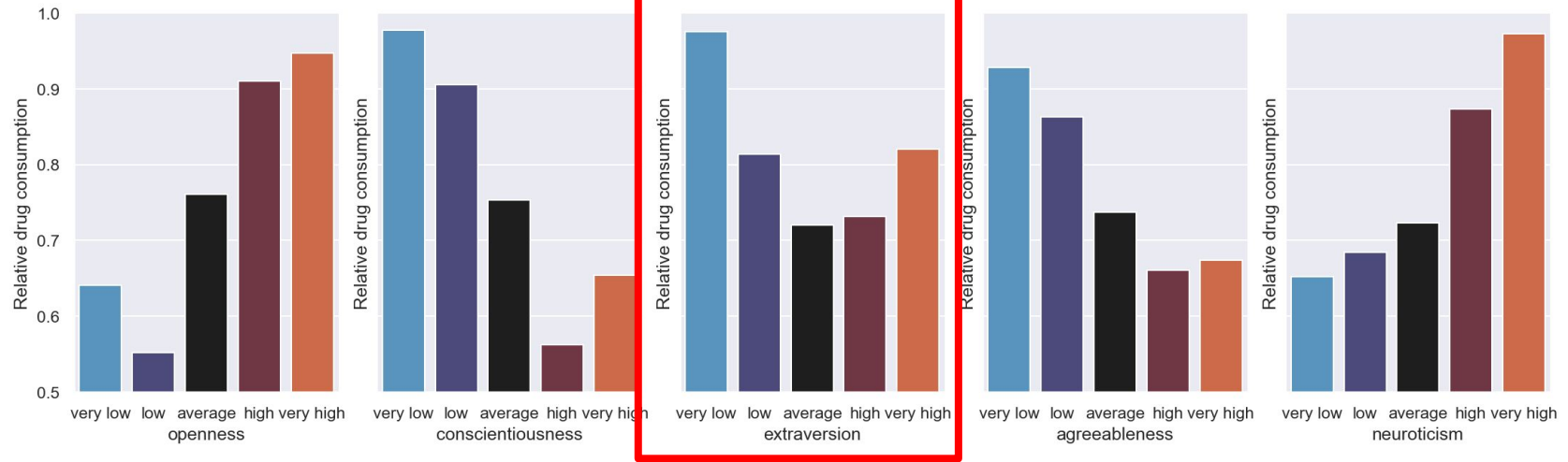
Personality characteristics of substance abusers (1)

- Drug abuse is more common for a high degree of openness and neuroticism



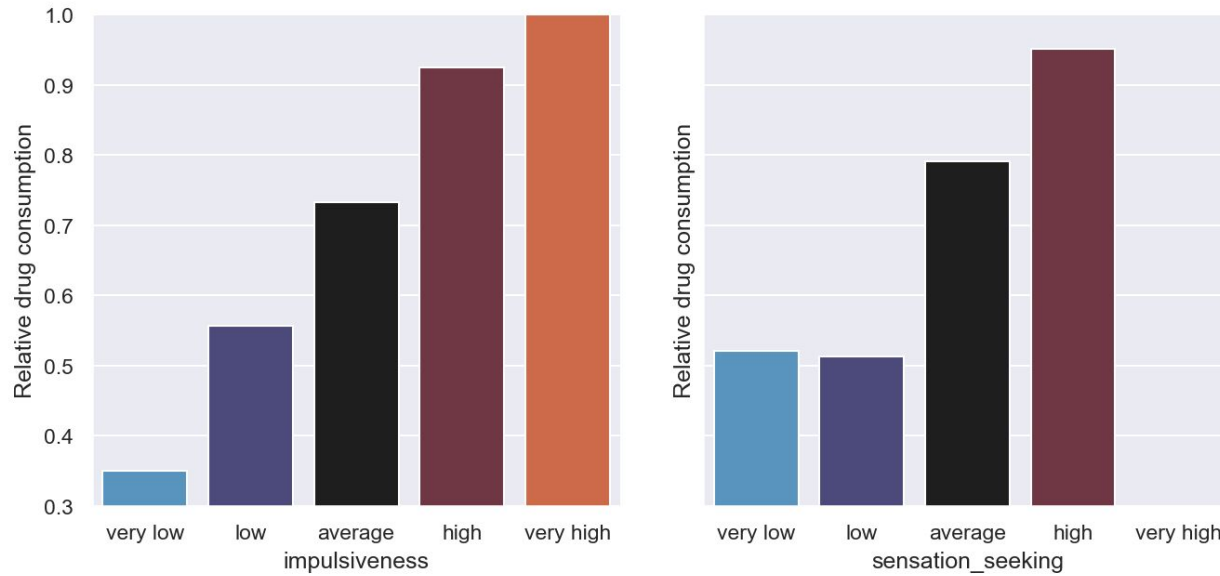
Personality characteristics of substance abusers (1)

- Drug abuse is more common for a high degree of openness and neuroticism
- Drug abuse less common for a high degree of conscientiousness and agreeableness



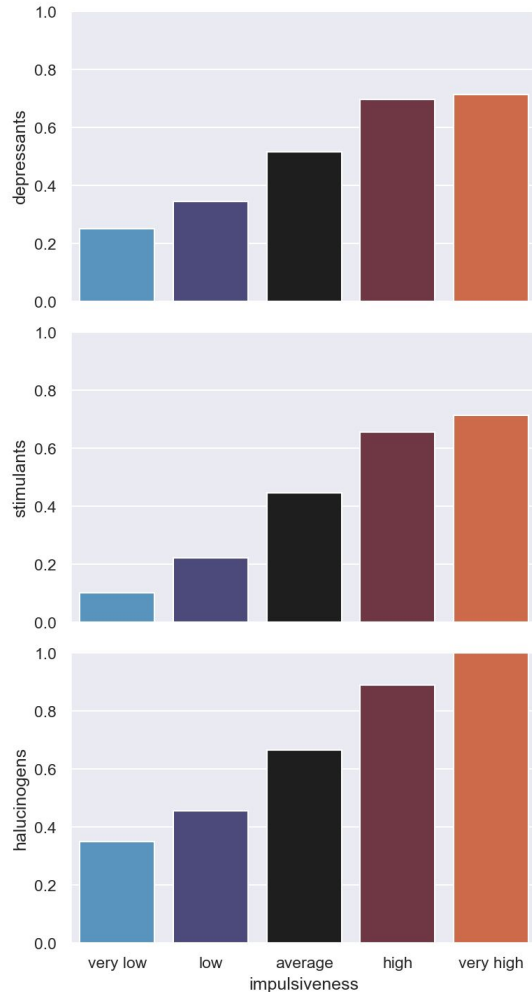
Personality characteristics of substance abusers (1)

- Drug abuse is more common for a high degree of openness and neuroticism
- Drug abuse less common for a high degree of conscientiousness and agreeableness
- Drug abuse is more common for a very high/low degree of extraversion



Personality characteristics of substance abusers (2)

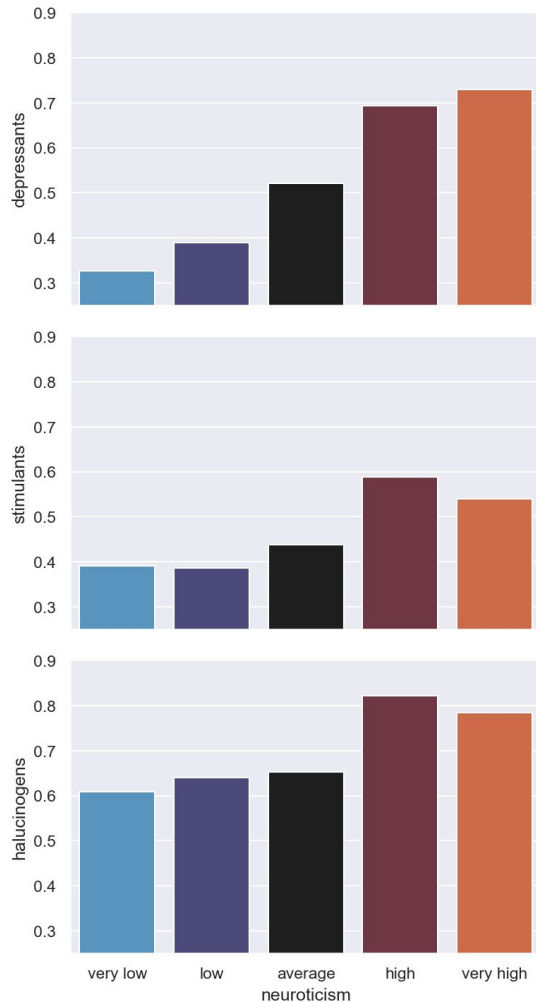
- Drug abuse is more common for a high degree of impulsiveness and sensation seeking
- Note: No survey participants with very high sensation_seeking score



Effect of personality across different drug types

Example: Impulsiveness

- The correlation of increased substance abuse with increased impulsiveness is similar across different drug types, i.e.
 - 1) depressants
 - 2) stimulants
 - 3) hallucinogens
- Note: Similar effects for all personality traits



Effect of personality across different drug types

Example: Neuroticism

- The correlation of increased substance abuse with increased neuroticism differs across different drug types, i.e.
 - 1) depressants
 - 2) stimulants
 - 3) hallucinogens

→ **EFFECTS ARE
MOST PRONOUNCED FOR DEPRESSANTS
WEAKER FOR STIMULANTS & HALLUCINOGENS**

Note: Higher levels of openness correlate most strongly with higher drug use for stimulants and hallucinogens

Model Building & Evaluation

1) Model Building

- Goal: Predict the personal risk of becoming a drug user
- For medical purposes by doctors/psychiatrists
- Separate model for each category of drugs (stimulants, hallucinogens, depressants)
- Tested six models with different hyperparameters

Model Building & Evaluation

2) Evaluation

- About **75 % accuracy**: Given 7 personality traits and socio-demographic information
- In a medical context, a False-Positive-Prediction is less severe than a False-Negative-Prediction
- When making predictions on human behaviour, accuracy rates will never be excellent

Outlook

- Investigate legal drugs
- Change definitions: drug user and non-user
- Repeat model without country, ethnicity and education
- Analysis on specific combinations of personality traits

Thank you for your Attention

Feel free to ask

Appendix

Fun:

- Jeder wird seine persönliche Droge finden ;)
- Fragen Sie den Dealer Ihres Vertrauens

Resources

- Data set:
<http://archive.ics.uci.edu/ml/datasets/Drug+consumption+%28quantified%29>
- Paper: E. Fehrman, A. K. Muhammad, E. M. Mirkes, V. Egan and A. N. Gorban, "The Five Factor Model of personality and evaluation of drug consumption risk.," arXiv, 2015
<https://arxiv.org/pdf/1506.06297.pdf>

