

## **Finding Patterns of Drug Misuse**

In this research we are primarily interested in the following two questions:

- What are the main factors affecting people's choice of using illegal drugs?
- What are the main factors affecting the severity of outcomes in drug misuse of people.

We used data from the RADARS® System Survey of Non-Medical Use of Prescription Drugs Program, and had defined drug misuse based on two categories of variables: using prescription drugs without prescription, and using illicit/illegal drugs for non-medical reason.

### *Visualization on Interested Variables*

Our first step was to visualize the distribution and the correlation between variables to obtain preliminary insight of this dataset. Figure 1 visualized the comparison between drug misuse and genders. The two plot shows there are more males having drug misuse experience for both using drugs without prescription and illegal drug use. In figure 2, we further explored drug misuse across different age groups. There are slightly more respondents that are 55-64 years old having misused prescription drug than others. Moreover, numbers of respondent within the age of 25-34 are significantly higher than any other age group for illegal drug use. In addition, we found that most misuse cases for prescribed drug belong to non-aboriginal respondents in figure 3. Whereas the pattern of people who use illegal drugs shows the opposite. Furthermore, we looked at the relationship between mental status and drug misuse in figure 4. We found that most respondents with prescription drug misuse experience don't have mental illness, but most of the respondents used illegal drugs do. Lastly, we visualized drug misuse in a geographic aspect and found that Quebec is the place with most cases of prescription drugs misuse, whereas Alberta (The West) is the place where illegal drug uses occur the most often.

### *Model*

Generalized linear mixed model was chosen to solve the proposed question, province was selected to be the random intercept since individual's chance of drug misuse can be affected by people living around them.

We first applied a general model for several demographic variables include those discussed above, this allows us to have a basic understanding of which variables have statistically significant effects toward people's chance of drug misuse and how much impact they have. The results are displayed in Table 1, being aboriginal people and having mental illness seems to be the top two variables that are most influential on people's chance of drug misuse. We then looked in detail of how these two variables affected the chance of drug misuse. As demonstrated in figure 6a and 6b, among the three types of aboriginal group, First Nation respondents have the highest chance of drug misuse. The result of a smaller GLMM analysis, which using only the aboriginal type variable and the random effect, had shown a similar result. Figure 8 and table 3 are some visualizations of our findings regarding the mental illness variable. Based on the model result, respondents with BPD have the highest percentage of experienced drug misuse. Our group had also looked into the severity of outcome for drug misuse of these two variables, we found that being First Nation or being diagnosed of BPD seems to be two characteristics that have most impact in having most severe outcome.

### *Conclusion*

In conclusion, with the aim of finding patterns of drug misuse in Canada, we investigated the most influential factors affecting people's choice of using illegal drugs, and had took a look at the severity of misuse outcome. We found that whether a patient is aboriginal and whether a patient has mental illness might be two key factors. In particular, based on the data provided, First Nation people have the highest chance of using illegal drugs and have achieved the severest outcome on average. And among all mental illness types, Borderline Personality Disorder (BPD) leads to the highest chance of illegal drug use as well as the severest outcomes.