**What impact does opioid usage have on American college students' ability to sleep?**

We have a data set that gives American college students information. In this part, we are going to show the relationship between the impact of opioid use on American college students’ sleep ability. We have so many variables in this data set.

**Dependent variables**

Variable name Variable label

N3Q13 Time to fall asleep

N3Q14 last 2 weeks, Average sleep per weeknight

N3Q15 last 2 weeks, Sleep - Have an extremely hard time falling asleep?

N3Q16D last 7 days, Sleep - Get enough sleep so that you felt rested.

**Independent variables**

Variable name Variable label

N3Q22B11 last 3 months, frequency of substances used Prescription Opioids ( morphine )

N3Q22I last 3 months, Opioids prescribed

Now we run the multivariate regression to see the effect of opioid use on American college students’ sleep ability. Here,



**Result**

Based on the regression analysis results, it appears that there is a relationship between opioid usage and American college students' ability to sleep.

Specifically, the frequency of prescription opioid usage (morphine) in the last three months (variable N3Q22B11) is negatively (-.0245132) associated with the time it takes to fall asleep (variable N3Q13), the average sleep per weeknight in the last two weeks (variable N3Q14), and the difficulty falling asleep in the last two weeks (variable N3Q15).

This means that as the frequency of prescription opioid usage increases, it takes longer for college students to fall asleep. They have less average sleep per weeknight and experience more difficulty falling asleep.

Additionally, the frequency of prescription opioid usage is positively ( .3882723 ) associated with the likelihood that college students will get enough sleep to feel rested in the last seven days (variable N3Q16D).

This means that as the frequency of prescription opioid usage increases, the likelihood that college students will get enough restful sleep also increases.

However, it is important to note that the coefficient for the variable N3Q22B11 is not statistically significant (p=0.659> 0.05) for the variable N3Q13, which means that the relationship between opioid usage and the time it takes to fall asleep is not statistically significant.

Overall, these results suggest that opioid usage negatively impacts American college students' ability to sleep, which could have negative consequences on their academic and personal lives.

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Above these variables, we can see the most correlated variable using the chi-square test.

After some chi-square tests, we can take the decision about the Average sleep par weeknight variable & frequency of substances used prescription opioids variable are associated.



The Pearson chi-square test in the table tests the association between average sleep per weeknight and frequency of prescription opioid use. The chi-square statistic is 141.8642 with 28 degrees of freedom and a p-value of 0.000, indicating a significant association between the two variables.

Hypothesis is:

H0: Opioid usage in the past will result in not poor sleep for college students.

H1: Opioid usage in the past will result in poor sleep for college students.

Now we fit the ordered logistic regression for measuring the effect of opioid uses on student nights of sleep ability:



This effect is statistically significant at the **0.05** level with a p-value of **0.000**. That means the null hypothesis is rejected.

The ordered logistic regression in the models the effect of frequency of prescription opioid use on average sleep per weeknight. The coefficient of N3Q22B11 (frequency of substances used Prescription Opioid) is **-0.2437** with a standard error of **0.0346**, indicating that as the frequency of prescription opioid use increases, the predicted value of average sleep per weeknight decreases.

The regression also estimates cut points for the ordered levels of average sleep per weeknight. The cut points represent the thresholds between the different levels of the dependent variable. In this case, the cut points represent the thresholds between the different levels of average sleep per weeknight.

These cut points can be used to interpret the coefficients in terms of the odds of being in a higher level of average sleep per weeknight. According to above table, the odds of being in a higher level of average sleep per weeknight are multiplied by exp**(0.2437) = 0.7848** for each unit increase in frequency of prescription opioid use, holding all other variables constant. The odds of being in a higher level of average sleep per weeknight are highest for cut 7 **(3.9999),** indicating that the highest level of average sleep per weeknight is associated with the lowest frequency of prescription opioid use. Similarly, the odds of being in a lower level of average sleep per weeknight are highest for cut 1 **(-3.8560),** indicating that the lowest level of average sleep per weeknight is associated with the highest frequency of prescription opioid use.

Overall, these results suggest that opioid usage negatively impacts American college students' ability to sleep, which could have negative consequences on their academic and personal lives.