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,

```
. mvreg N3Q13  N3Q14 N3Q15 N3Q16D = N3Q22B11 N3Q22I
```

Equation	Obs	Parms	RMSE	"R-sq"	F	P
N3Q13	462	3	1.251277	0.0078	1.796511	0.1670
N3Q14	462	3	1.492212	0.0392	9.353305	0.0001
N3Q15	462	3	1.806572	0.0845	21.17447	0.0000
N3Q16D	462	3	1.964332	0.0599	14.62898	0.0000

	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
N3Q13						
N3Q22B11	-.0245132	.0554378	-0.44	0.659	-.1334566	.0844302
N3Q22I	-.0052324	.0030264	-1.73	0.085	-.0111797	.000715
_cons	3.287666	.1517898	21.66	0.000	2.989377	3.585955
N3Q14						
N3Q22B11	-.2536624	.0661124	-3.84	0.000	-.383583	-.1237418
N3Q22I	-.004505	.0036092	-1.25	0.213	-.0115976	.0025875
_cons	4.754767	.1810171	26.27	0.000	4.399042	5.110492
N3Q15						
N3Q22B11	-.4627137	.0800401	-5.78	0.000	-.6200043	-.3054231
N3Q22I	-.0081328	.0043695	-1.86	0.063	-.0167195	.0004539
_cons	5.956193	.2191514	27.18	0.000	5.525528	6.386857
N3Q16D						
N3Q22B11	.3882723	.0870297	4.46	0.000	.2172463	.5592983
N3Q22I	.0103369	.0047511	2.18	0.030	.0010004	.0196735
_cons	2.287435	.2382889	9.60	0.000	1.819163	2.755708

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.

```
.  tabulate N3Q14 N3Q22B11 , chi
```

Last 2 weeks: average sleep per weeknight	Last 3 months: frequency of substances used - Prescription opioids (morphine, c Never	Once or t	Monthly	Weekly	Daily or	Total
Less than 4 hours	36	7	6	6	4	59
4 hours	83	22	9	7	6	127
5 hours	297	62	15	16	5	395
6 hours	544	96	13	4	4	661
7 hours	596	84	6	13	4	703
8 hours	286	47	6	4	1	344
9 hours	91	6	1	2	2	102
10 or more hours	29	7	1	1	2	40
Total	1,962	331	57	53	28	2,431

```
          Pearson chi2(28) = 141.8642   Pr = 0.000
```

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.

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

```
. ologit N3Q14 N3Q22B11

Iteration 0:   log likelihood = -4205.5003
Iteration 1:   log likelihood = -4180.8697
Iteration 2:   log likelihood =  -4180.796
Iteration 3:   log likelihood =  -4180.796

Ordered logistic regression                     Number of obs     =      2,431
                                                LR chi2(1)        =      49.41
                                                Prob > chi2       =     0.0000
Log likelihood =  -4180.796                     Pseudo R2         =     0.0059
```

N3Q14	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
N3Q22B11	-.2436599	.0345801	-7.05	0.000	-.3114356	-.1758842
/cut1	-3.856048	.1346997			-4.120055	-3.592042
/cut2	-2.638844	.0801848			-2.796003	-2.481684
/cut3	-1.282004	.0513477			-1.382644	-1.181364
/cut4	-.0610337	.0433788			-.1460545	.0239871
/cut5	1.292411	.0523784			1.189751	1.39507
/cut6	2.688959	.0873585			2.517739	2.860179
/cut7	3.999923	.1598952			3.686534	4.313312

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. This effect is statistically significant at the **0.05** level with a p-value of **0.000**.

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.