Geography and Geoinformation Science

Crash Course

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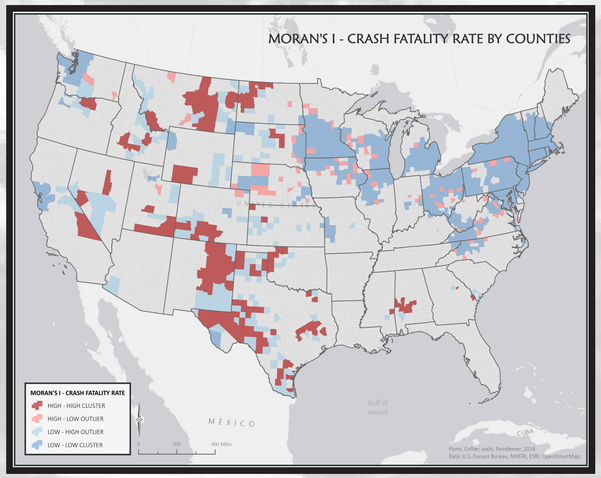
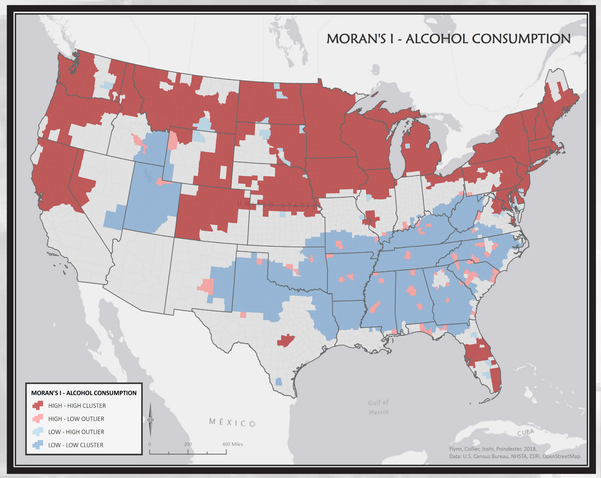
Introduction

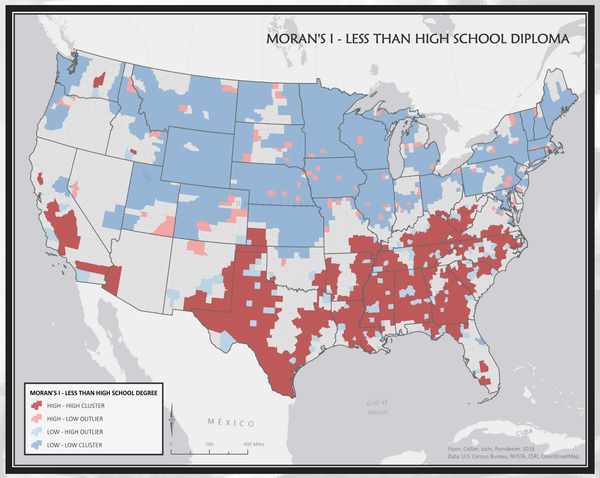
On average, there are 40,000 fatalities in the U.S. that are caused by car crashes every year. Many people will blame alcohol, elderly drivers, unexperienced or uneducated people for these types of crashes. The amount of cars on the road is only increasing in the U.S. and commuting times are going up meaning people are going to be spending more time on the road. Considering how much time we are going to spend on the road, we should try and ensure that those roads are safe. We can do this by determining what the causes of these accidents are and emplace policies to help mitigate the fatal crash rates. Using the power of GIS, this is what our project will accomplish while also trying to find areas that seem to lack crashes or have too many.

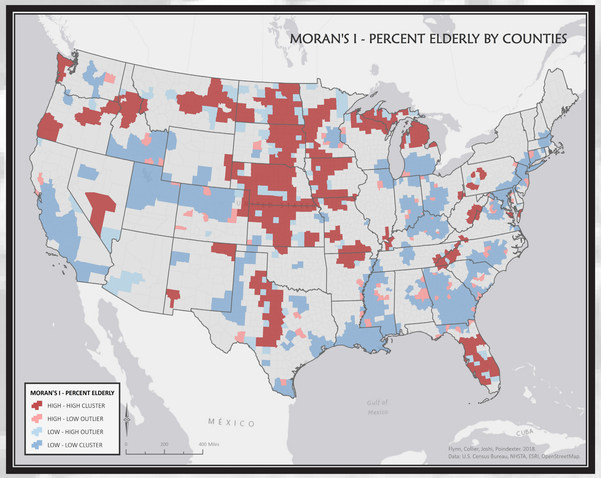
Methods

For our analysis, we used 5 different variables. The dependent variable was fatal car crash rate per county and the independent variables were alcohol consumption, elderly population, high school education, and average sleep. All of the IV's were also rates. We ran simple regression analysis to test the correlation between these values to determine if there were any relationships. The beta coefficients are expected to be low because crash rate has a low spread and low values. We are also going to create Moran's I maps in order to visually see any significant clusterings in our data. Finally, we will get the Global Moran's I to find quantitative evidence of clusterings. Our group believes that there will be positive relationship with alcohol consumption and elderly percentage based on the research we did on this topic. Many papers tested the relationship between the elderly and how they have a higher chance of crashing. Also, alcohol is known to impair judgement, so a county with a higher consumption rate, we believe, will correlate to a higher crash rate.









Results

Regression Analysis

Dependent Variable	Independent Variable	R^2	Beta	F-Statistic	p-value
Car Crashes per County	% of Alcohol consumption	0.00186	-0.0002	5.78	0.01625
	% of less than a high school degree	0.00744	0.00091	23.24	0
	% of elderly population	0.00174	0.0007	5.41	0.01998
	% of sleep	0.00051	-0.00008	1.59	0.2

Nearest Neighbor Analysis

	Global Moran's I	z-score	p-value
Alcohol Consumption	0.795786	8.552889	0
Percent Elderly	0.4205	4.522485	0
Education	0.536795	5.772435	0
Sleep	0.211013	2.560252	0.01

Conclusion

Our results were very different from what our group expected. The most surprising factor was that alcohol consumption had a negative relation with crash rate, meaning that the more alcohol consumed, the less crashes there were. The education rate showed that more people without a high school degree lead to more crashes happening with a coefficient of .00091. This was also the case with the elderly as there was a positive relation there as well. What we found interesting was that the average sleep data was insignificant and the coefficient was near zero, showing no relation to crash rates. The amount of sleep you have is irrelevant to whether or not you will crash. Lastly, we found an interesting outlier in Loving, Texas, which has less than 100 people living in it which skewed its crash rate result.

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