



# Should Marijuana be Legalized?

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AP Statistics

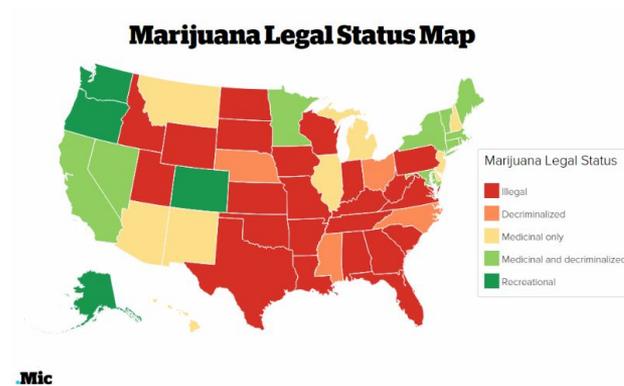
Mr. Selvaag

2017

# Intro

This is a nationally-discussed topic, as some believe marijuana should be legalized for medicinal use at a minimum, while many also want to see a full legalization of marijuana for recreational use.

We hope to discover the realities behind these beliefs, such as whether maturity plays a role in people's' feelings, as well as if there is a difference between the preferences of males compared to females.



# Research Questions

Do upperclassmen and underclassmen differ with respect to stance on marijuana legalization?

Do males and females differ with respect to stance on marijuana legalization?



# Data Collection

We created a survey, which had three questions:

- Grade:
- Biological Sex: (Male / Female)
- Should marijuana be legalized across the United States? (Yes / No)



# Procedure

- Using the complete list of 5th hour classrooms, we created separate lists that grouped classes by the grade level of their students. Then, we randomly selected classrooms from each list, by using a random number generator, and surveyed the selected classes.
- Our survey method was an example of cluster sampling, because we can assume that each classroom we surveyed has similar demographics to the entire school, which is the population.

# Data Analysis



## Underclassmen Response

	Yes	No	Total
Male	22 (18.8)	4 (6.2)	26
Female	16 (18.2)	8 (5.8)	24
Total	38	12	50

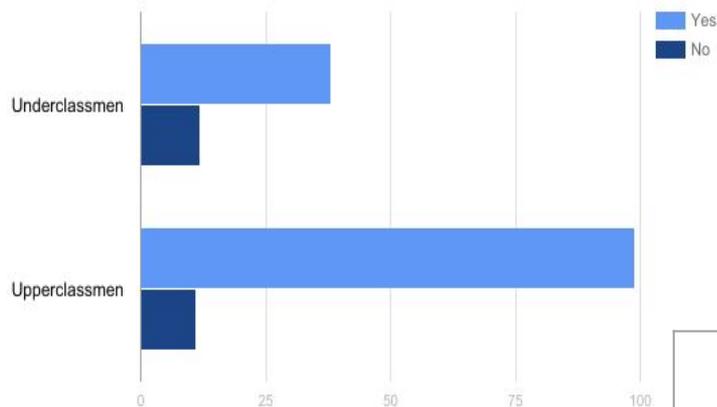
## Upperclassmen Response

	Yes	No	Total
Male	58 (52.2)	0 (5.8)	58
Female	44 (46.8)	11 (5.2)	52
Total	99	11	110

(Expected Counts in parentheses)

# Underclassmen vs. Upperclassmen Data

Should Marijuana be Legalized?



(Expected Counts in parentheses)

Where Will Recreational Marijuana Be Legal Next?



	Yes	No	Total
Underclassmen	38 (42.8)	12 (7.2)	50
Upperclassmen	99 (94.2)	11 (15.8)	110
Total	137	23	160

# Inference

**P** - We are interested in if Washburn underclassmen and upperclassmen differ with respect to stance on marijuana legalization

**H** -  $H_0$ : Underclassmen and upperclassmen are the same with respect to stance on marijuana legalization

$H_a$ : The populations are not the same

**A** - Random: We grouped classrooms by grade level, and randomly selected classes from which we collect data

Independent: Our sample had 50 underclassmen and 110 upperclassmen, and since there are more than  $50(10) = 500$  underclassmen and more than  $110(10) = 1100$  upperclassmen at Washburn, the 10% Condition applies and our test is independent

Large Counts Condition: All expected counts are greater than 5

**N** - We will use a Chi-Square Test for Homogeneity

**T** -  $\chi^2 = \sum (O-E)^2 / E$  ,  $df = (r-1)(c-1)$

$$= (38 - 42.8)^2 / 42.8 + (12 - 7.2)^2 / 7.2 +$$

$$(99 - 94.2)^2 / 94.2 + (11 - 15.8)^2 / 15.8$$

$$= 0.538 + 3.2 + 0.245 + 1.458 = 5.441$$

**O** - Using the blue packet with  $\chi^2 = 5.441$  and  $df = 1$ , we obtain  $.01 < P < .02$

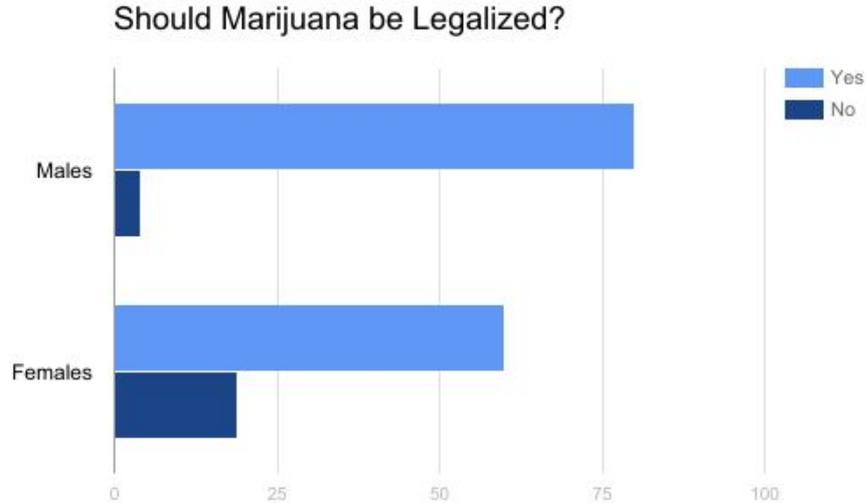


**M** - Because the P-value is significant at the  $\alpha = .05$  level, we reject  $H_0$

**S** - There is strong evidence that upperclassmen and underclassmen aren't the same with respect to stance on marijuana legalization



# Male vs. Female Data



	Yes	No	Total
Males	80 (72.1)	4 (11.9)	84
Females	60 (67.9)	19 (11.1)	79
Total	140	23	163

(Expected Counts in parentheses)



# Inference

**P** - We are interested in if Washburn male and female students differ with respect to stance on marijuana legalization

**H** -  $H_0$ : Males and females are the same with respect to stance on marijuana legalization

$H_a$ : The populations are not the same

**A** - Random: We grouped classrooms by grade level, and randomly selected classes from which we collect data

Independent: Our sample had 84 males and 79 females, and since there are more than  $84(10) = 840$  males and more than  $79(10) = 790$  females at Washburn, the 10% Condition applies and our test is independent

Large Counts Condition: All expected counts are greater than 5

**N** - We will use a Chi-Square Test for Homogeneity

**T** -  $\chi^2 = \sum (O-E)^2 / E$  ,  $df = (r-1)(c-1)$

$$= (80 - 72.1)^2 / 72.1 + (4 - 11.9)^2 / 11.9 +$$

$$(60 - 67.9)^2 / 67.9 + (19 - 11.1)^2 / 11.1$$

$$= 0.866 + 5.245 + 0.919 + 5.623 = 12.652$$



**O** - Using the blue packet with  $\chi^2 = 12.652$  and  $df = 1$ , we obtain  $P < .0005$

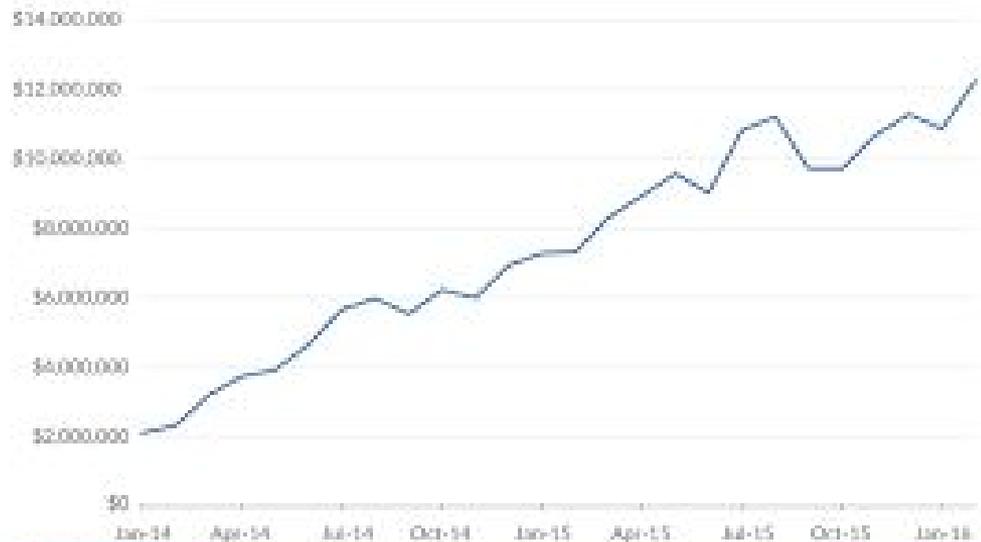
**M** - Because the P-value is significant at the  $\alpha = .05$  level, we reject  $H_0$

**S** - There is strong evidence that males and females aren't the same with respect to stance on marijuana legalization



# Final Summary

Colorado Retail Marijuana Tax Revenue by Month



Source: Colorado Department of Revenue

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# Conclusions

There is both a correlation between biological sex and stance on marijuana legalization, as well as a correlation between grade level and stance on marijuana legalization



# Limitations

- We selected students in blocks (classrooms), so the samples were not entirely random
- Some classrooms may take the survey as a joke, which skews the data
- Despite the fact that the survey was anonymous, students may have not expressed their true feelings towards the topic due to peer pressure



# Future Studies

- We could also have explored the correlation between age and stance on the legalization of marijuana, by comparing high school students as a whole to adults
  - This may lead to a larger difference on the topic, because there would be a much larger gap in age compared to only surveying underclassmen and upperclassmen
- Bonus stat: 21 out of 76 students who wished to share with us admitted that they have used marijuana before