
ISyE 2028 – Basic Statistical Methods - Fall 2015
Bonus Project: “Big” Data Analytics
Final Report

Topic: **The relationship between alcohol abuse and college GPA**

1. Research Motivation: College drinking is a serious problem throughout the American colleges because students who consume alcohols are less likely to focus on their academic works. So I decided to collect data about the relationship between alcohol abuse and GPA.

2. Research Procedure: Before I started this research, I searched some preexisting or similar research on the Internet. Since this topic is a very important issue, there were many studies and articles about it. After referring some of questions and research procedure from preexisting research, I made my survey form. I handed out surveys to my Georgia Tech friends. There are 10 questions asking respondents drinking habits and thoughts about college drinking. 30 respondents participated in this survey. After collecting the survey data, I analyzed them using methods I learned from class.

3. Data in College Drinking (from the Internet):

(1) Data from National Institute on Alcohol Abuse and Alcoholism:

- 60% of college students drank alcohol in the past month
- 25% of college students report academic consequences from drinking including missing class, falling behind in class, doing poorly on exams or papers and receiving lower grades overall.
- Binge drinkers who consumed alcohol at least 3 times per week were roughly 6 times more likely than those who drank but never binged to perform poorly on a test of project as a result of drinking.

(2) Data from College Drinking-Changing the culture

- Assault: 696,000 students between the ages of 18 and 24 are assaulted by another student who has been drinking.
- Sexual Abuse: 97,000 students between the ages of 18 and 24 are victims of alcohol-related sexual assault or date rape
- Police Involvement: About 5 percent of 4-year college students are involved with the police or campus security as a result of their drinking
- Alcohol Abuse and Dependence: 31 percent of college students met criteria for a diagnosis of alcohol abuse and 6 percent for a diagnosis of alcohol dependence in the past 12 months, according to questionnaire-based self-reports about their drinking

4. A SURVEY FORMAT

11/15/15-11/21/15

1. Male or Female?

- (1) Male (2) Female

2. What year are you in?

- (1) First
- (2) Second
- (3) Third
- (4) Fourth
- (5) Fifth or more

3. How many times do you drink per week?

- (1) 5-7 times
- (2) 2-4 times
- (3) Once a week
- (4) I don't drink at all

4. How much do you drink on a typical day when you are drinking?

- (1) a bottle of beer
- (2) 2-4 bottles of beer
- (3) more than 5 bottles of beer
- (4) I don't drink beers. I only drink hard liquors. (next question)
- (5) I don't drink alcohols.

5. How many shots of hard liquors do you drink?

- (1) 1-2 shots
- (2) 3-5 shots
- (3) 5-7 shots
- (4) about 10 shots

6. Have you ever missed your class because of a hangover?

- (1) Yes (2) No

7. Have you ever thought alcohol consumption affects your grades?

- (1) Yes (2) No

8. What is your GPA last semester?

- (1) Above 3.5
- (2) Above 3.0
- (3) Above 2.5
- (4) Above 2.0
- (5) Below 2.0

9. Do you think drinking reduces your stresses from school works?

- (1) Yes (2) No

10. Do you think there is a correlation between alcohol abuse and GPA?

- (1) Yes (2) No

5. A Survey Result

1. Male or Female?

(1) Male: 19(63.32%) (2) Female: 11(36.66%)

2. What year are you in?

(1) First: 7(23.3%)
(2) Second: 12(40%)
(3) Third: 6(20%)
(4) Fourth: 4(13.33%)
(5) Fifth or more: 1(3.3%)

3. How many times do you drink per week?

(1) 5-7 times: 4(13.33%)
(2) 2-4 times: 10(33.33%)
(3) Once a week: 14(46.67%)
(4) I don't drink at all: 2(6.67%)

4. How much do you drink on a typical day when you are drinking?

(1) a bottle of beer: 5(16.67%)
(2) 2-4 bottles of beer: 7(23.33%)
(3) more than 5 bottles of beer: 12(40%)
(4) I don't drink beers. I only drink hard liquors: 4(13.3%)
(5) I don't drink alcohols. 2(6.67%)

5. Do you define yourself as a binge drinker?

(1) Yes: 20(66.66%) (2) No: 10(33.33%)

6. Have you ever missed your class because of a hangover?

(1) Yes: 25(83.33%) (2) No: 5(16.67%)

7. Have you ever thought alcohol consumption affects your grades negatively?

(1) Yes: 7(23.33%) (2) No: 23(76.67%)

8. What is your GPA last semester?

(1) Above 3.5: 8(26.67%)
(2) Above 3.0: 15(50%)
(3) Above 2.5: 5(16.67%)
(4) Above 2.0: 2(6.67%)
(5) Below 2.0: 0(0%)

9. Do you think drinking reduces your stresses from school works?

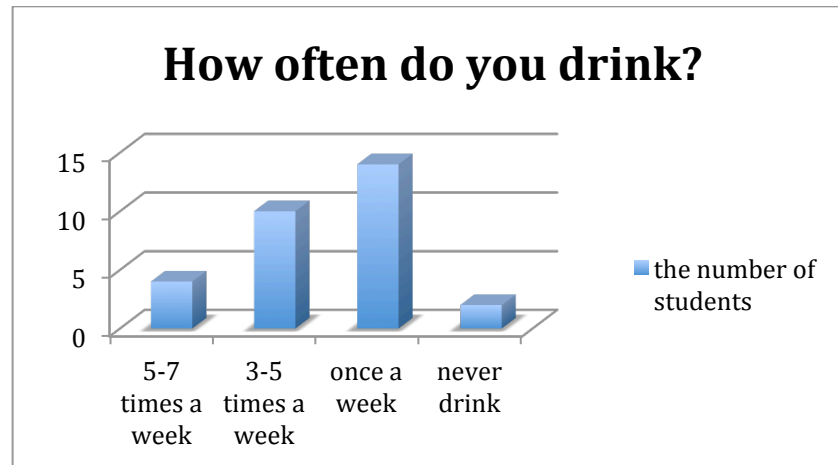
(1) Yes: 27(90%) (2) No: 3(10%)

10. Do you think there is a correlation between alcohol abuse and GPA?

(1) Yes: 28(93.3%) (2) No: 2(6.67%)

6. Data Analysis:

Question 3: How many times do you drink per week?



Is sample size large enough?

$$E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} \quad n = \left[\frac{z_{\alpha/2} \sigma}{E} \right]^2$$

-Assume Confidence Interval has to be 95%

-Z-score of 95%=1.96

Standard deviation=1.8

$$E = 1.96 * (1.8 / \sqrt{30}) = 0.64$$

$$N = [(1.96 * 1.8) / 0.64]^2 = 30.3877$$

Is your finding statistically significant?

Null Hypothesis: Students drink 2 times per week.

Alternative Hypothesis: Students drink less than 2 times per week.

Significance level $\alpha = 0.05$

$$Z_0 = (2.267 - 2) / (1.80 / \sqrt{30}) = 0.81$$

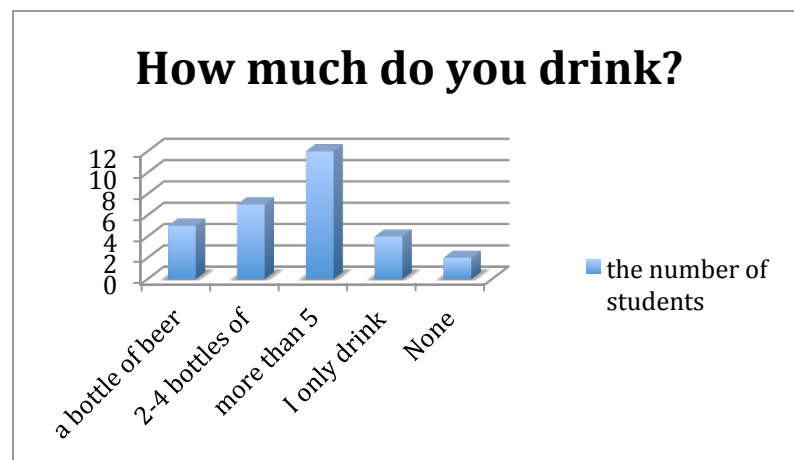
$$Z_{\alpha} = 1.96$$

To reject this hypothesis $-Z_{\alpha}$ has to be larger than Z_0 . But it's smaller than Z_0 . So null hypothesis cannot be rejected. As a result, we can conclude that statistically not significant.

Do you have a representative sample or its biased?

I believe my sample is biased because students who answered they drank last week were more than 93%. However, according to the data from 5000 students show 4 out of 5 students (80%) drank pas week.

Question 4: How much do you drink?



Is sample size large enough?

Standard deviation=2.87

$$E = 1.96 * (2.87 / \sqrt{30}) = 1.03$$

$$N = [(1.96 * 2.87) / 1.03]^2 = 29.83$$

Is your finding statistically significant?

Null Hypothesis: Students drink 5 bottles of beer.

Alternative Hypothesis: Students drink less than 5 bottles of beer.

Significance level $\alpha = 0.05$

I'm counting "I only drink hard liquors" as 10 bottles of beer.

$$Z_0 = (4.5 - 5) / ((2.87) / \sqrt{30}) = -0.95$$

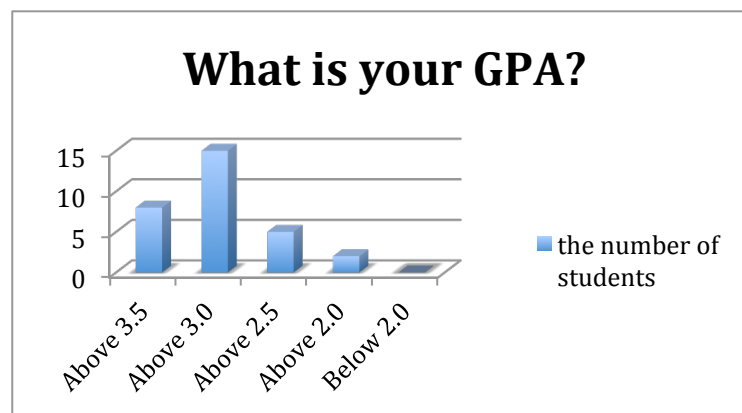
$$Z_{\alpha} = 1.96$$

Since -0.95 is larger than -1.96, the null hypothesis cannot be rejected. So we can say this data are statistically not significant.

Do you have a representative sample or its biased?

It is reported that college students drink 5 bottles of beer. According to my data, the average was 4.5. As there is 0.5 different from original data it's biased.

8. What is your GPA?



Is sample size large enough?

Standard deviation = 0.43

$$E = 1.96 * (0.43 / \sqrt{30}) = 0.15$$

$$N = [(1.96 * 0.43) / 0.15]^2 = 31.56$$

Is your finding statistically significant?

Null Hypothesis: GPA of students who drank past week is 3.0

Alternative Hypothesis: GPA of students who drank past week is more than 3.0

Significance level $\alpha = 0.05$

$$Z_0 = (3.23 - 3.0) / (0.43) / \sqrt{30} = 3.0$$

$$Z_{\alpha}=1.96$$

Since 3.0 is larger than 1.96 I can reject null hypothesis. So this finding is statistically significant.

Do you have a representative sample or its biased?

The average GPA of Georgia Tech students is 3.13. The GPA of students who drank pas week is 3.23, which is higher than those of average Georgia Tech students. So this sample is little biased.

Total Review

How can I improve my result?

After analyzing this survey results, I realized that it's always important to have many subjects. My data are from only 30 respondents.

Can you use it for anything real?

The conclusion of my project is students with GPA above 3.5 all drink at 1.8 times a week. This shows alcohol helps Georgia Tech students get rid of their stresses. However, this conclusion is way different from common college students in the United States. Based on the fact that 90% of students think drinking does not taint GPA and students who drink alcohol regularly have higher GPA than average Georgia Tech students' GPA, I believe the number of alcohol consumption and GPA are proportional to each other.