Group 1: How do BU students commute on the Charles River campus?

By Aarom Guillaume, Aziza Barkuschwabe, HaoTian (Kris) Liu and Jaskaran Singh

Introduction

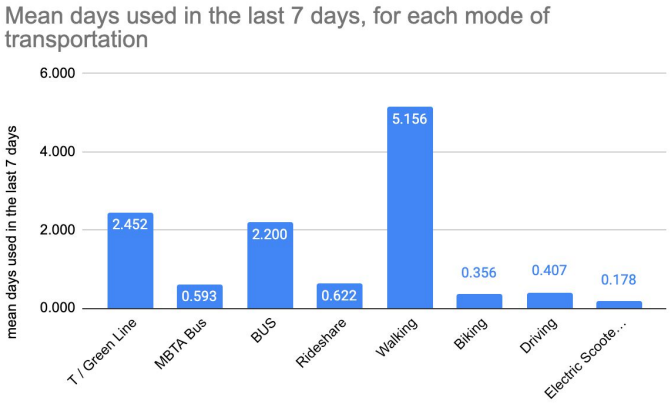
- Our desires for choosing this topic:
  - Due to BU's unique campus layout, we were interested to see the various methods of transport used by the undergraduate students on the Charles River Campus
  - Understand which method of transportation is most preferred as well as least preferred by the students, to make potential improvements
- Hypotheses we aimed to investigate:
  - Frequency of T and MBTA bus usage is correlated to satisfaction with transportation overall.
  - Students who live off campus ride the T and BUS more times per week than students who live on campus.
  - There is a correlation between overall transportation satisfaction and GPA.

Methods

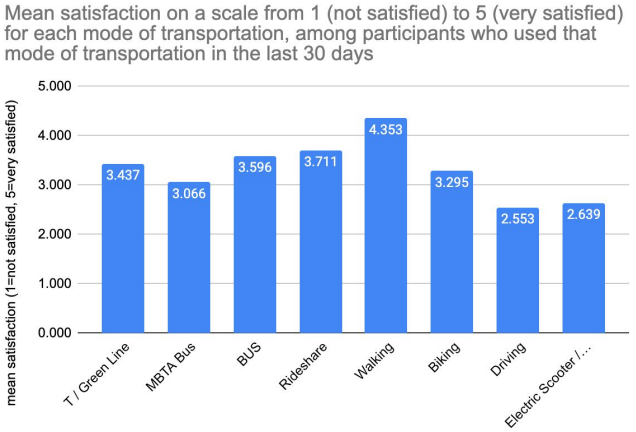
- Our population of interest is the 17,000 full-time undergraduate students at BU, the sample represents the students who responded to the survey that we created
- We used a Google Form to collect data. We asked students about the mode of transportation they used and how frequent they used it in the last week. We also asked them to give an overall rating of the transportation
- We asked about other basic information such as GPA, class year, school/major, and housing location
- Contacted people via social media and asked people in person around campus

Results

General Trends



Comparison of mean frequency of use for each mode of transportation.



Comparison of mean satisfaction with each mode of transportation, among respondents who used each respective mode of transportation in the last 30 days.

Other results

1 Confidence interval of population proportions of students

Freshman (0.14125, 0.275351) | Sophomore (0.449423, 0.6154) | Junior (0.147577, 0.283428) | Senior (0.03033, 0.112577)

2 Confidence interval of population proportion of students who live off campus

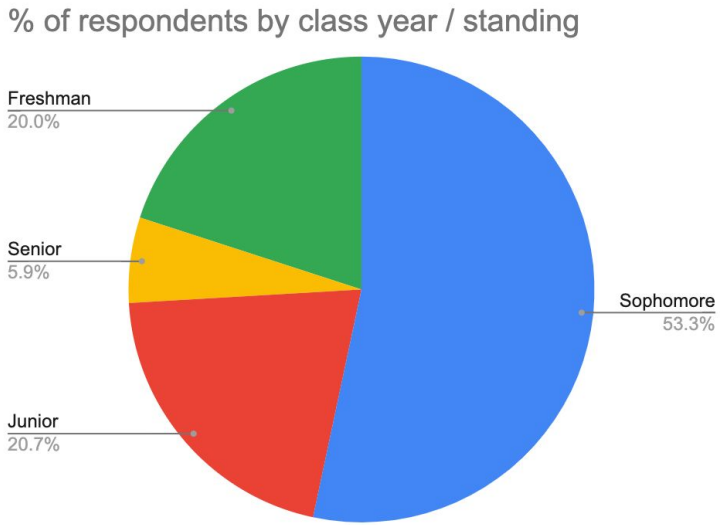
Off campus (0.160329, 0.299486) | East & central campus (0.307354, 0.46937) | South campus (0.097996, 0.21777) | West campus (0.134956, 0.26724) | Other area on campus (0.025341, 0.103161)

3 Confidence interval of population mean of students who take different transportation methods

Sum of T and MBTA Bus (2.5832252, 3.5056637) | T / Green Line (2.0942309, 2.8094728) | MBTA Bus (0.3994047, 0.7857804) | BUS (1.8393195, 2.5606805,) | Rideshare (0.4573324, 0.7871121) | Walking (4.741264, 5.5698471) | Biking (0.1785231, 0.532588) | Driving (0.2022761, 0.6125387) | Electric Scooter / Skateboard (0.0384795, 0.317076)

Addressing Sampling Bias

Class year: Sophomores overrepresented

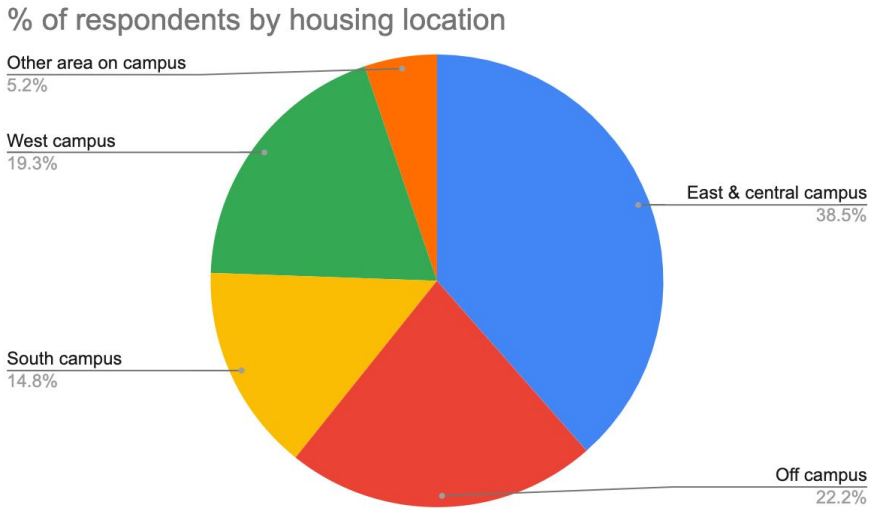


95% C.I.s: Freshman (0.14125, 0.275351) | Sophomore (0.449423, 0.6154) | Junior (0.147577, 0.283428) | Senior (0.03033, 0.112577)

Housing location: Off campus underrepresented

According to “Student Housing Trends: 2021”, a report published by the City of Boston, the proportion of full-time BU undergraduates (not studying abroad) who live off campus is approximately 36.1%.

From our data, the 95% C.I. for the proportion of off campus students: (0.160329, 0.299486)



Hypothesis Testing

Hypothesis 1

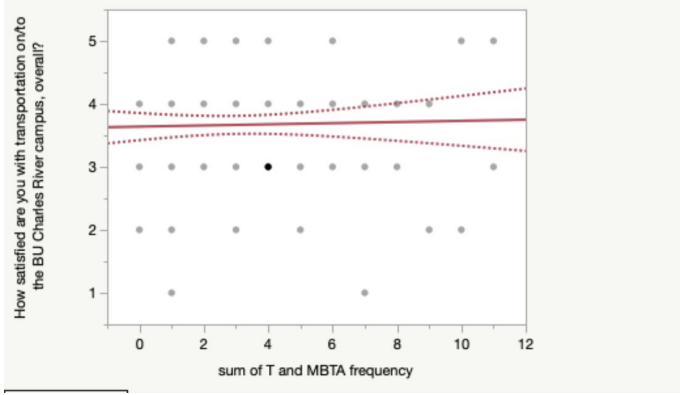
R^2(level of correlation)	α	MBTA Use(β_1)	P-Value
.000876	.05	.0091488	.7333

The frequency of the Green Line and the MBTA Bus is inversely related to the overall satisfaction with transportation

Null Hypothesis: $\beta_1 = 0$

Alternative Hypothesis: $\beta_1 \neq 0$

Inference: At a confidence level of 95% (or $\alpha = 0.05$). The p-value, which is 0.7333, is greater than 0.05, so we **fail to reject the null hypothesis**



Issue: GPA data was not normally distributed

Hypothesis 2

Housing location	Sample mean ($\bar{x}$)	Standard deviation (s)	Count (n)
On campus	4.438095238	3.278495813	105
Off campus	5.4000	3.783813074	30

$$Z = \frac{(\bar{X}_1 - \bar{X}_2)}{\sqrt{s_1^2/n_1 + s_2^2/n_2}}$$

Students who live off campus will use the T and BUS more frequently than on campus residents.

Test statistic (z-value)	P-value (from the Standard Normal distribution)
1.263469457	0.1038

Null hypothesis: $(\mu_{off} = \mu_{on}) = (\mu_{off} - \mu_{on} = 0)$

Alternative hypothesis: $(\mu_{off} > \mu_{on}) = (\mu_{off} - \mu_{on} > 0)$

Inference: At a confidence level of 95% (or $\alpha = 0.05$).
The p-value, approximately 0.1038, is greater than 0.05.
We fail to reject the null hypothesis.

Issues: Small sample size (n=30) for off campus sample.

Hypothesis 3

R^2(level of correlation)	α	Transportation Satisfaction (β_1)	P-Value
0.006603	0.05	0.2312858	0.4708

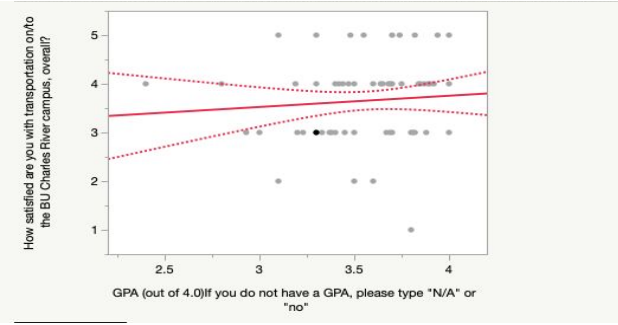
The mode of transportation used by the respondent will have no correlation to the respondents GPA.

Null Hypothesis: $\beta_1 = 0$

Alternative Hypothesis: $\beta_1 \neq 0$

Inference: At a confidence level of 95% (or $\alpha = 0.05$). The p-value, which is 0.4708, is greater than 0.05, so we **fail to reject the null hypothesis**

Issues: GPA data was not normally distributed, as well as having an unrepresentative sample.



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