

A+

Eat Your Way to an A!

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P. 3 Stats Mr. Selvaag 2017



Research Question

Is there an association between how often Washburn High School students eat breakfast before school and their cumulative GPA?

Apparently, breakfast is the most important meal of the day, we wanted to see whether or not eating breakfast would have an affect on students grades.

We assume there is an association between eating breakfast more often and having a higher GPA



Data Collection

We carried out a well designed survey in the Media Center of Washburn High School. As far as our sampling procedure goes, we got all of our data from Juniors and Seniors in the media center. We did this because their GPA is more long term as opposed to underclassmen. We picked the media center because we assumed it would be randomized already, given it's a spot random kids go every day and every hour.

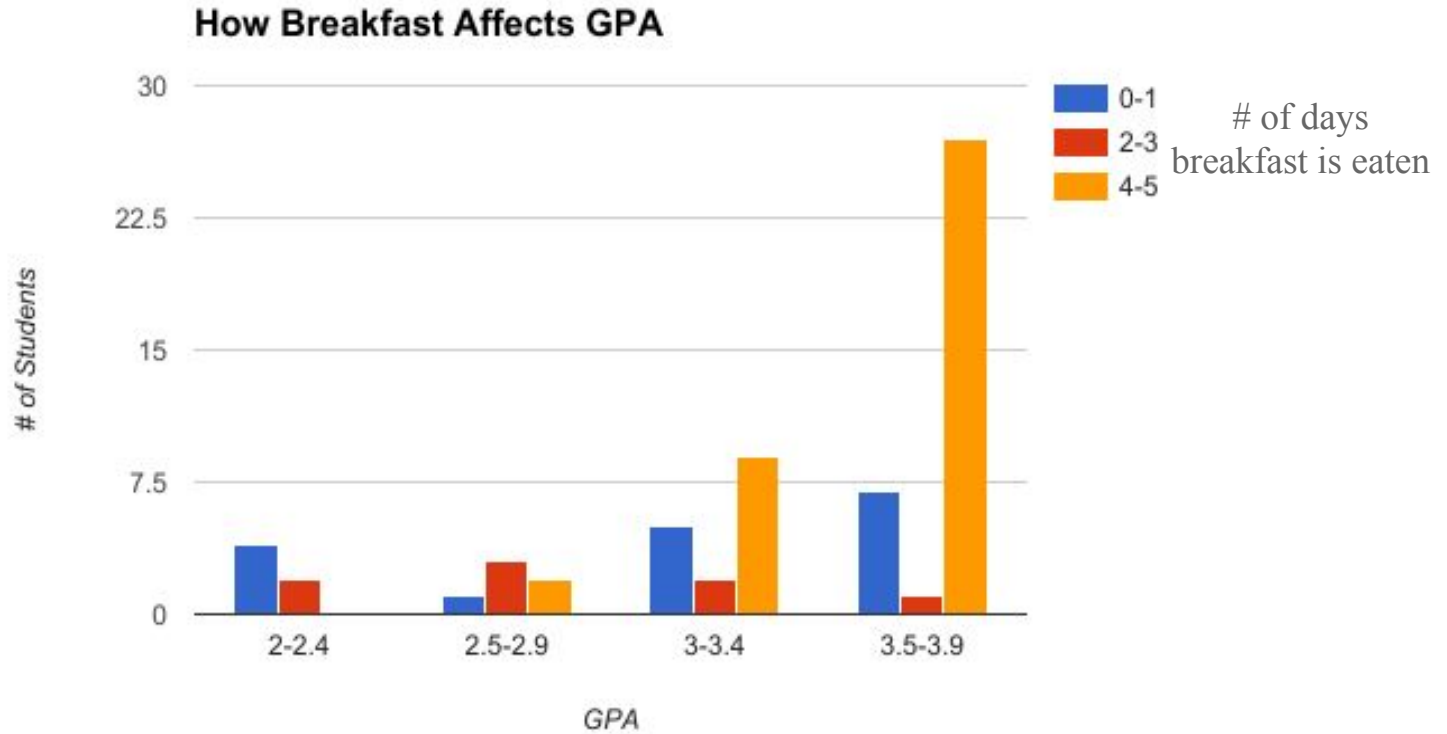


Tables

Original Data	Average # of days breakfast is eaten			Total
	0-1	2-3	4-5	
GPA				
2-2.4	4	2	0	6
2.5-2.9	1	3	2	6
3-3.4	5	2	9	16
3.5-3.9	7	1	27	35
Total	17	8	38	63

Expected Values	Average # of days breakfast is eaten		
	0-1	2-3	4-5
GPA			
2-2.4	1.62	0.76	3.62
2.5-2.9	1.62	0.76	3.62
3-3.4	4.32	2.04	9.65
3.5-3.9	9.45	4.44	21.11

Graph



Analysis

- Response bias
- Non-response bias
- LCC not met, small sample taken
- Type 1: There is no association, we think there is
- Type 2: There is an association and we think there is not



Inference Procedure

We are interested in if there is an association between how often high schoolers eat breakfast before school and their GPA's

H_0 : There is no association between how often high schoolers eat breakfast and their GPA's

H_a : There is an association between how often high schoolers eat breakfast and their GPA's



Inference Procedure

✓ **Random:** Sample comes from media center which is a place where random students go.

✓ **Independent:** We had a sample population of 63; there are more than 630 students in Washburn High School.

✗ **Large Counts Condition:** Not all expected counts are at least 5, which we understand may limit the accuracy of our project.

We will carry out a Chi-Square Test of Association/Independence.



Inference Procedure

$$\chi^2 = \sum \frac{(O - E)^2}{E} = \sum \frac{(4 - 1.62)^2}{1.62} + \frac{(1 - 1.62)^2}{1.62} + \frac{(5 - 4.32)^2}{4.32} + \dots + \frac{(27 - 21.11)^2}{21.11} = 21.765$$

$$df = (r-1)(c-1) \quad \alpha = .05$$

$$df = (4-1)(3-1) = 6 \quad P = .0013 \text{ (table = } .001 < P > .0025)$$

Calculations from Chi-Square test in the calculator

Inference Summary

Because the P-value was significant at the alpha level 0.05, we reject the null hypothesis.

There is strong evidence that there is an association between how often students eat breakfast before school and their GPA's.

Overall Summary



We have concluded that there is an association

One limitation was our sample size, could influence accuracy, LCC

Even though data was taken from media center, it was not completely randomized

If we had more time, we could have used rand. Int. on the calculator and assigned a number to each classroom, then taken an SRS of students in each given classroom