



What kind of Candy do you Crave?

Austyn Kimbrell and Hadley Schuld
Ap Statistics
Mr. Selvaag
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Sweet History



Chocolate

- Chocolate has been around for more than 4,000 years and has even been used as currency
- Originally consumed as a bitter-sweet drink, cacao plants were first found in the rainforests of Central America
- The first chocolate bar was not produced until 1847 but today the average American consumes about 12-pounds of chocolate annually

Fruity

- Originally, fruity candy consisted of a mixture of honey, fruit, and nuts
- Gummi worms were not produced until 1982 by the Trolli candy company
- Most fruity gummy candy is a mix of cornstarch, corn syrup, sugar, gelatin, flavor, and coloring

Sour

- Sour Patch kids originate from Ontario, Canada
- They were originally shaped like martians, until the 80s when Cabbage Patch Kids become popular

Research Question:

Is there an association between gender and candy preference: chocolate, fruity, or sour?

We were interested in seeing if gender has any correlation over candy choice. We were intrigued by this question after discussing our own candy preferences with friends we realized that many females would choose chocolate and males would choose either fruity or sour candy.

Do you think there will be a correlation?



Our Hypothesis

We thought that statistically females would have a higher preference for chocolate than males.



Data Collection

A Stratified and clustered Random Sample was used to collect our data

1. We used the chart of classes provided by Mr. Selvaag to select english classes from each grade level
2. Then, we numbered english classes in hours 3 and 4
3. Upon giving the englishes classes their numbers, we used the random integer function on the calculator to randomly select 4 classes, one from each grade level (stratification)
4. We then created a Survey in which students wrote down their gender and then marked off their candy preference
5. After collecting the data we performed a Chi square test for association/independence

Survey

Specify your gender and candy preference

Gender:

Candy Preference:

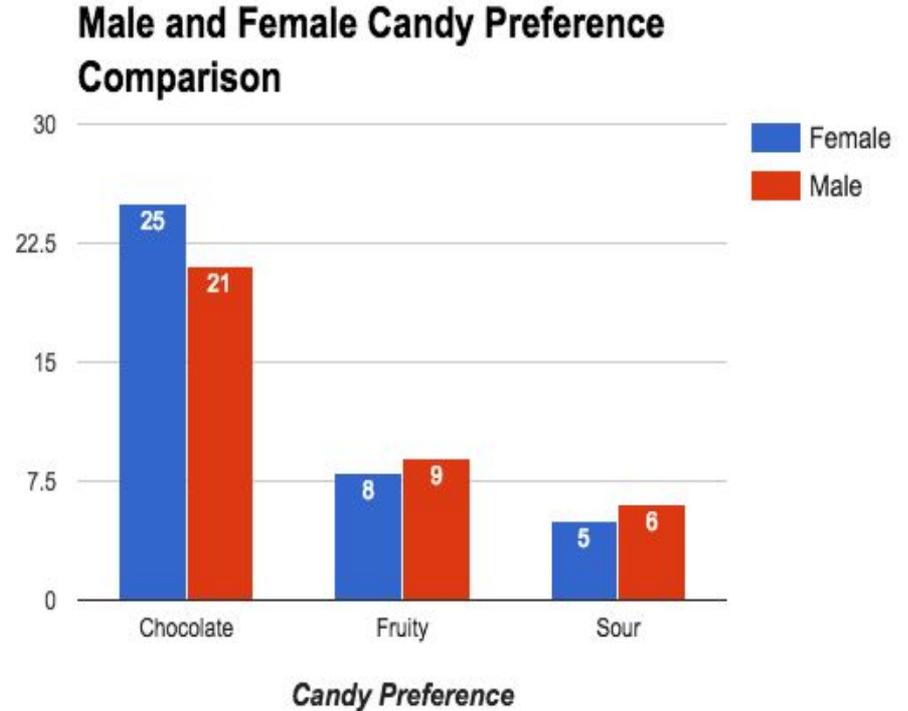
Chocolate _____

Fruity _____

Sour _____

Graphs!

Candy	Female	Male	Totals
Chocolate	25	21	46
Fruity	8	9	17
Sour	5	6	11
Totals	38	36	74



Data Explanation

- Our sample consisted of 74 students
- 51% identified as female
- 49% identified as male
- Just over 62% of students favored chocolate
- About 23% of students favored fruity candy
- About 15% of students favored sour candy



Chi Square Test For Association

Parameter: We are interested interested in if there is an association between gender and Candy preference

Hypotheses:

Ho: There is no association between gender and candy preference, they are independent

Ha: There is an association between gender and candy preference



✓ yes

Assumptions

Random: Our sample was taken randomly as discussed in our data collection process

Independent: Our sample of 74 students follows the 10% condition in that it is less than 1/10 of the total student population of Washburn
($n \leq 1/10 N$)

Large Counts Condition: All of our expected counts are at least 5

(All expected counts ≥ 5)

Expected = (row total)(column total) / grand total



Test Time!



Female

Candy Preference	Observed	Expected	(O-E) ² / E
Chocolate	25	23.662	0.075
Fruity	8	8.7297	0.061
Sour	5	5.6486	0.074

Chi Sq.
Value 0.21

Male

Candy Preference	Observed	Expected	(O-E) ² / E
Chocolate	21	22.378	0.084
Fruity	9	8.2703	0.064
Sour	6	5.3514	0.078

Chi Sq.
Value 0.226

Combined Chi Sq. Values: $0.21 + 0.226 = 0.436$

Finding P-Value

Degrees Freedom: $(\text{row}-1)(\text{column}-1) = (3-2)(2-1) = 2$

Percentage Points of the Chi-Square Distribution

Degrees of Freedom	Probability of a larger value of χ^2								
	0.99	0.95	0.90	0.75	0.50	0.25	0.10	0.05	0.01
1	0.000	0.004	0.016	0.102	0.455	1.32	2.71	3.84	6.63
2	0.020	0.103	0.211	0.575	1.386	2.77	4.61	5.99	9.21
3	0.115	0.352	0.584	1.212	2.366	4.11	6.25	7.81	11.34
4	0.297	0.711	1.064	1.923	3.357	5.39	7.78	9.49	13.28
5	0.554	1.145	1.610	2.675	4.351	6.63	9.24	11.07	15.09



Chi Sq. = .448

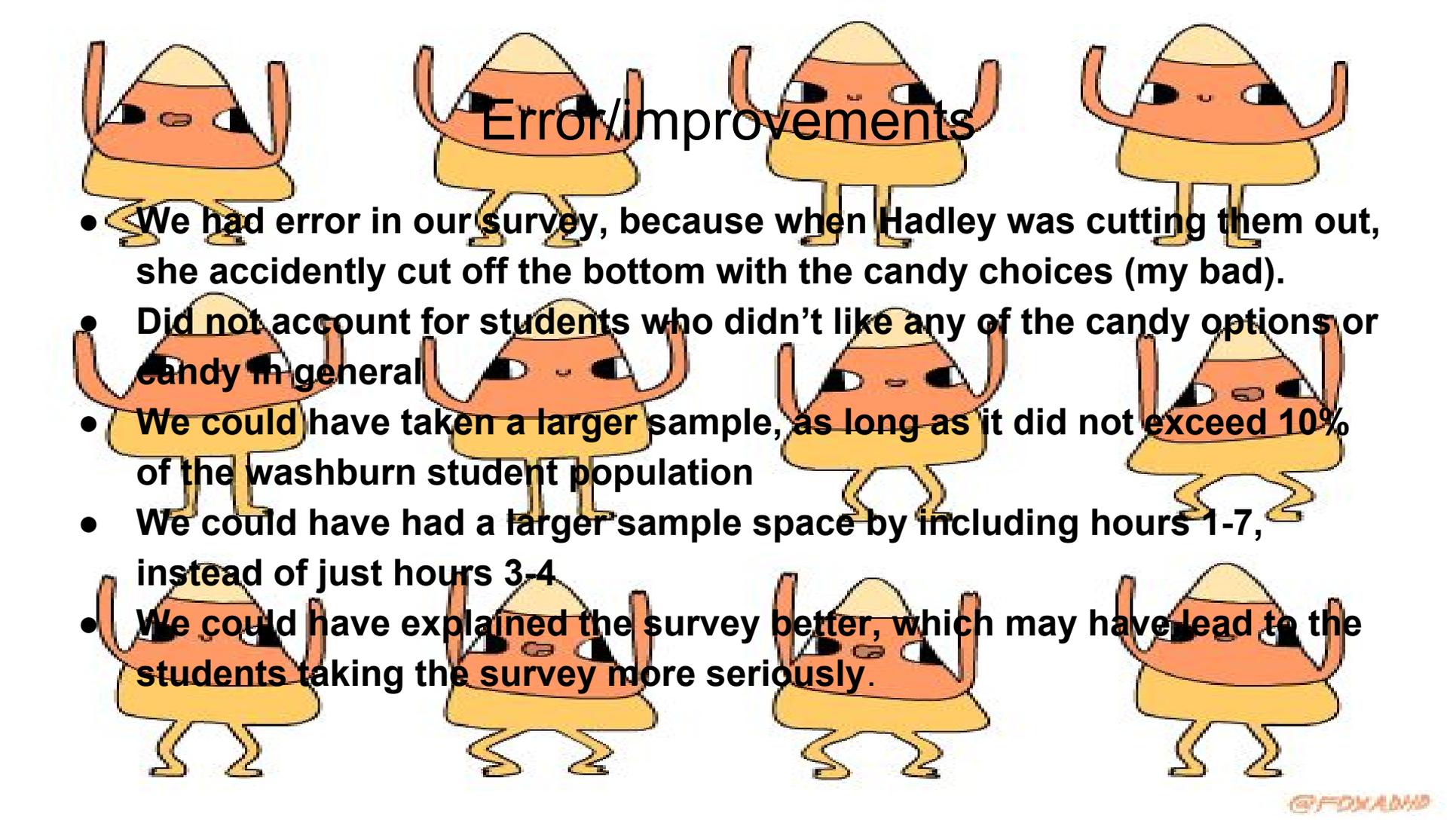
P-Value = .8

Decision and Conclusion

The P-value is not significant at the 5% level, so we fail to reject the null hypothesis.

There is not strong evidence that there is an association between gender and candy preference.





Error/improvements

- We had error in our survey, because when Hadley was cutting them out, she accidentally cut off the bottom with the candy choices (my bad).
- Did not account for students who didn't like any of the candy options or candy in general.
- We could have taken a larger sample, as long as it did not exceed 10% of the Washburn student population.
- We could have had a larger sample space by including hours 1-7, instead of just hours 3-4.
- We could have explained the survey better, which may have led to the students taking the survey more seriously.