

In this research study, we examined the number of times fried food was consumed per week in underclassmen, upperclassmen, and graduate students at Ohio University. Frying is a common cooking procedure in the United States that increases the energy density of foods and can negatively influence people's health. Excess consumption of energy-dense foods can lead to overweight/obesity, with resulting chronic diseases. College students in particular are often plagued with quick food choices, so it may be more likely they consume fast fried foods over healthier options. Also, the most purchased foods at Ohio University dining halls are French fries and chicken nuggets, both of which are fried (Bohyer, 2016). This study is important because the obesity epidemic is rapidly increasing and fried food consumption is a major contributor to empty calories (USDA, 2015). In addition to obesity being a major risk factor for chronic disease and contributing to 7 out of the top 10 causes of death worldwide, it is also the largest contributor to preventable healthcare costs, contributing over \$200 billion per year (Willet et al., 2006; Cawley & Meyerhoefer, 2012). Additionally, we are graduate students in food and nutrition and are very interested in the obesity epidemic and the contributing factors.

We collected the data by sending a Qualtrics survey link to the students in the food and nutrition sciences Department at Ohio University. We proposed two questions in this survey. First, we asked students to identify their class ranks as underclassmen (freshmen or sophomore), upperclassmen (junior or senior) or graduate student. The second question asked the student to fill out the number of times they consumed fried food per week. We collected data from 20 underclassmen, 20 upperclassmen, and 20 graduate students.

There were many factors that we controlled for. The first factor is the students were all

enrolled in at least one nutrition class in the Department of food and nutrition sciences, at the same university. The second factor we controlled for was dividing the groups based on class rank. The third factor we controlled for was equal sampling in all three groups. Factors we did not control for include gender and actual age. We did not control for the gender and age of our research participants because we are interested in the consumption of fried foods per week among general nutrition-related majors regardless of college students' gender and age. We also did not control for a student's access to the dining halls or an at-home kitchen. This could influence what a student has available to eat.

We expect to find that there is a significant difference in the number of times fried foods are consumed per week among underclassmen, upperclassmen and graduate students.

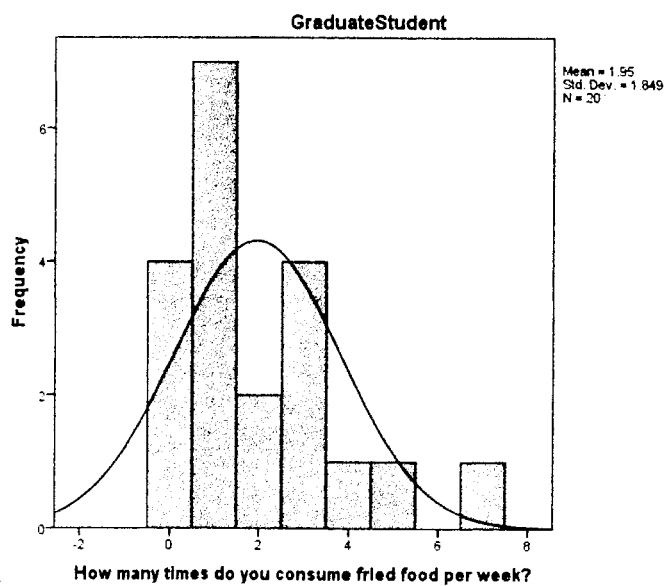
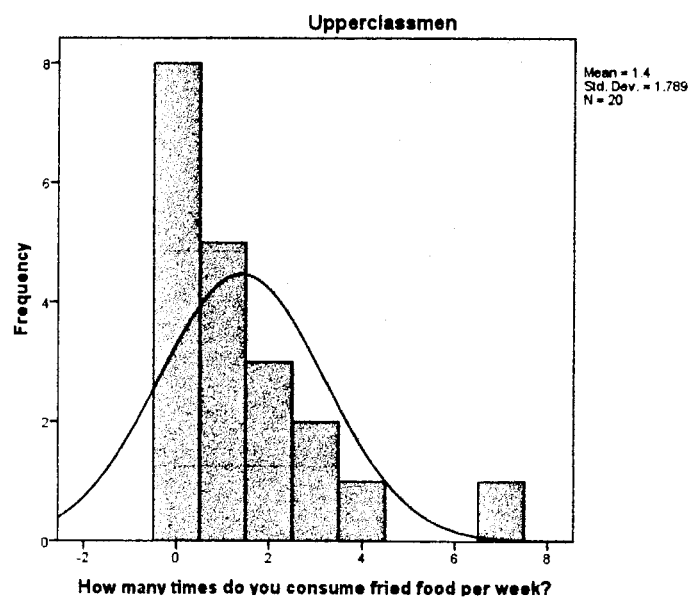
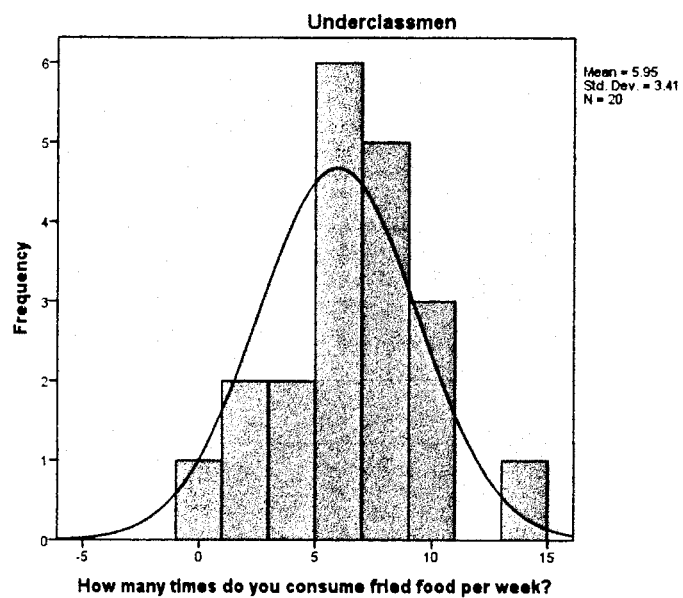
Underclassmen are required to have meal plans, making fried foods more readily available in the dining halls and we predict that they will have the greatest consumption of fried foods per week.

Our independent variable is class rank (underclassmen, upperclassmen, and graduate students). Our dependent variable is the number of times students consume fried foods per week. The raw data is shown below, displaying the number of times students in each group consume fried foods per week.

Underclassmen	Upperclassmen	Graduate Students
5	1	3
7	7	1
10	3	1
5	1	1
3	0	0
8	0	2
5	2	3
10	0	0
14	3	0
7	0	4
5	0	1
10	1	3
5	1	1
3	1	1
7	4	3
1	0	2
2	0	7
0	2	5
5	0	0
7	2	1

The next few of paragraphs, will introduce the three assumptions associated with ANOVA: normality, homogeneity of variance and independence of observations (Howell, 2011).

The assumption of normality means that the scores in each population are normally distributed around the population mean (Howell, 2011). Below please find three histograms of the distributions for each group. By looking at the shape of the three histograms, the data of the underclassmen group is normally distributed. However, the data of the upperclassmen group and graduate group are slightly positively skewed. Our data violated normality, however we do not think it has a major effect on our results because our data is so far in the reject region.



The assumption of homogeneity of variance is that each population of scores has the same variance (Howell, 2011). The “rule” for homogeneity of variance is a four times differences. The variances for this research study do not violate this assumption as the standard deviations (listed below) are within this range, therefore we conclude that we do not violate homogeneity of variance.

Descriptives

How many times do you consume fried food per week?

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean
					Lower Bound
Underclassmen (Freshman or Sophomore)	20	5.95	3.410	.763	4.35
Upperclassmen (Junior or Senior)	20	1.40	1.789	.400	.56
Graduate Student	20	1.95	1.849	.413	1.08
Total	60	3.10	3.171	.409	2.28

The last and most important assumption is independence of observations (Howell, 2011). This assumption means that the groups are completely separate from one another, meaning the scores/answer of one participant does not systematically related to the scores of any other participants (Howell, 2011). This assumption cannot be violated in a one-way ANOVA. In this case, the answers from different class ranks did not influence one another because students answered the survey independently and other participants cannot view each other's answers. Therefore, the three groups, underclassmen, upperclassmen, and graduate students are independent of each other.

In the next few pages, please find the results of the one-way ANOVA test, including our hypothesis, critical value, and the SPSS output.

The null hypothesis and alternative hypothesis are as follows:

H_0 : There is no significant difference in number of fried foods consumed per week when comparing underclassmen, upperclassmen and graduate students from the food and nutrition science Department at Ohio University.

H_1 : At least one group mean is significantly different in number of fried foods consumed per week when comparing underclassmen, upperclassmen and graduate students from the Food and Nutrition Science Department at Ohio University.

The criteria for making a decision about the null hypothesis is $F_{.05}(2, 57) = 3.18$ (Howell, 2011). The between group degree of freedom is 2 and the within group degree of freedom is 57 as shown in the SPSS output below. Again, this gives us the critical value of 3.18 at $\alpha=0.05$ (Howell, 2011).

Based on our SPSS output (below), our F value is 20.280. Based on our critical value of 3.18, we reject the null hypothesis. Our interpretation is that at least one group mean is significantly different in number of fried foods consumed per week when comparing underclassmen, upperclassmen and graduate students from the Food and Nutrition Science Department at Ohio University.

ANOVA

How many times do you consume fried food per week?

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	246.700	2	123.350	20.280	.000
Within Groups	346.700	57	6.082		
Total	593.400	59			

Based on our rejecting of the null hypothesis, it is appropriate to do a Fisher's LSD posttest to determine where the significant differences are. Please find our results of the Fisher's LSD posttest below.

Multiple Comparisons

Dependent Variable: How many times do you consume fried food per week?

LSD

		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
Class rank	Class rank				Lower Bound	Upper Bound
Underclassmen (Freshman or Sophomore)	Upperclassmen (Junior or Senior)	4.550*	.780	.000	2.99	6.11
	Graduate Student	4.000*	.780	.000	2.44	5.56
Upperclassmen (Junior or Senior)	Underclassmen (Freshman or Sophomore)	-4.550*	.780	.000	-6.11	-2.99
	Graduate Student	-.550	.780	.484	-2.11	1.01
Graduate Student	Underclassmen (Freshman or Sophomore)	-4.000*	.780	.000	-5.56	-2.44
	Upperclassmen (Junior or Senior)	.550	.780	.484	-1.01	2.11

*. The mean difference is significant at the 0.05 level.

For the Fisher's LSD Posttest, our t critical value: $t_{.05}(57) = \pm 2.009$

(Howell, 2011). The standard error is 0.780.

Based on the analysis of the Fisher's LSD, we can conclude that we have significant differences between underclassmen and upperclassmen, as well as underclassmen and graduate students.

Below please find our table for the effect size using eta-squared.

Between-Subjects Factors			
		Value Label	N
Class rank	1	Underclassmen (Freshman or Sophomore)	20
	2	Upperclassmen (Junior or Senior)	20
	3	Graduate Student	20

Tests of Between-Subjects Effects						
Dependent Variable: How many times do you consume fried food per week?						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	246.700 ^a	2	123.350	20.280	.000	.416
Intercept	576.600	1	576.600	94.797	.000	.624
Group	246.700	2	123.350	20.280	.000	.416
Error	346.700	57	6.082			
Total	1170.000	60				
Corrected Total	593.400	59				

a. R Squared = .416 (Adjusted R Squared = .395)

We reported the effect size using eta-squared as 0.416. This indicates that 41.6% of the variability in number of fried foods consumed per week can be attributed to class rank of underclassmen, upperclassmen, or graduate student.

In conclusion, this research looked at fried food consumption per week among underclassmen, upperclassmen, and graduate students in the Food and Nutrition Science Department at Ohio University. Each group had twenty students answer a Qualtrics survey asking class rank and number of times per week fried foods are consumed. The dependent variable is number of times fried foods are consumed per week while the independent variable is class rank (upperclassmen, underclassmen and graduate students). We controlled

for students taking at least one nutrition class, class rank, and number of participants in each group. We did not control for gender or age. Our project violated normality, but did not violate homogeneity of variance and independence.

We found that there is a significant difference between underclassmen and upperclassmen and between underclassmen and graduate students. These results are what we expected. There is also a significant difference between underclassmen and graduate students. This result is also what we expected. Based on underclassmen's access to the dining hall, we expected their consumption to be significantly different than upperclassmen and graduate students.