Earth Conscious Behavior of OU Students

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Abstract

Amid growing concerns of environmental issues, such as resource depletion and climate change, an understanding of college student altruistic and egocentric behavior can offer insight into approaches for change. Students of higher education may become the advocates for changing societal norms that can augment environmental problems. Therefore, knowledge of scholars' environmental awareness and supporting activities could help understand the factors the influence pro-environmental behaviors. A wide range of information about individual behavior that impacts the environment was collected by surveying 100 University of Oklahoma students. Key findings include a relationship between percent of trash recycled by students and their classification, and student's perception of local water safety is related to their opinion of local water taste. The information gathered from our sample population could be instrumental in improving environmental friendly programs and practices on campus by highlighting key determinants for specific actions.

Introduction

Public awareness about the unsustainable nature of current economic development and ecological degradation has provoked social appeal for change. In the United States, the rate of waste generation and resource consumption have reached levels higher than ever before ("Reduce, Reuse, Recycle, Buy Recycled | Pacific Southwest: Solid Waste | EPA"). As a response, communities recognize the need for a bottom-up approach to implementing more sustainable practices. While the term sustainability has yet to be conclusively defined, many people around the world agree that the influence of the education sector on tomorrow's leader is the key to shifting society towards sustainability (Hopkins 13). Students of higher education institutions will carry their practices and value systems from the academic to professional sector, imparting their knowledge and experience on to the surrounding or new communities. Furthermore, for many communities, the local university or college stands as a pillar of the community from which the surrounding city's development is modeled. Therefore, environmentally friendly enterprise on university campuses can greatly impact city-wide action and even policy.

Municipal Solid Waste

A large environmental concern for communities is the amount of solid waste that ends up in local landfills. Currently, municipal solid waste in landfills is the largest source of human-related methane emissions in the Unites States, which is an important greenhouse gas with the potential the impact climate change (Czepiel 593; Change, IPCC Climate). Furthermore, pollution and toxins from landfills pose a threat to local water supply and air quality. With over

20,000 students currently attending the University of Oklahoma, the student population makes up over a quarter of the total population of Norman and can create around 86,000 pounds of solid waste each day (“About OU”; ”Reduce, Reuse, Recycle, Buy Recycled | Pacific Southwest: Solid Waste | EPA”). So, in spring 2009, the University of Oklahoma campus was outfitted with around 20 outdoor recycling trash cans for plastic and aluminum, in addition to previously established recycling efforts (“OU Recycling Overview”). Also, the City of Norman has introduced the Green Norman initiative with efforts to reduce waste and create a cleaner environment through recycling and compost, compressed natural gas to replace fleet vehicles, and water conservation ("Green Norman | City Of Norman, Oklahoma").

Local Water Quality Controversy

Another important issue of concern in Norman includes the controversy of local water safety. In 2004, the U.S. Environmental Protections Agency declared that the level of arsenic in the ground water of Norman, Oklahoma exceeded established standards. As a result, the city constructed new wells to replace the wells with elevated arsenic (Smith). Additionally, recent water supply faces concerns about high levels of the potential cancer-causing element, Chromium-6. The City of Norman is working with the Environmental Protection Agency to determine the health risks associated with Chromium-6 in drinking water in order to make an informed decision about appropriate safety implementations ("Norman Water Quality: Issues Of Interest | City Of Norman, Oklahoma”).

While commendable, the efforts by the City of Norman and the University to build a more sustainable community will only be successful if the youth that may become drivers of

social change actively participate through pro-environmental behavior. The EPA provides suggestions for individuals to reduce waste including buying less, using reusable shopping bags and beverage containers, recycling, and purchasing recycled products ("Reduce, Reuse, Recycle, Buy Recycled | Pacific Southwest: Solid Waste | EPA"). Even though these are excellent recommendations, many different factors may inhibit or encourage actions such as these on the University of Oklahoma campus. For example, individual perceptions of local water supply safety may impact plastic water bottle consumption.

The purpose of this study is to examine pro-environmental and egocentric behavior of University of Oklahoma students as well as individual opinions about ecological concerns, such as local water quality issues and climate change. The results of this study have implications for improving pro-environmental behavior of university students, therefore, improving the success of sustainability-focused programs. The paper is composed of three sections. The first section explains the methods of information collection through the use of a student survey and the complications that occurred during survey response collection and during analysis of the answers. The second section displays the results of data analysis through various statistical and qualitative analyses. The final summary and conclusions section highlights key findings and an overall summary including recommendations for improvement of the study.

Data and Methods

In order to analyze the pro-environmental behavior of OU students and the relationship between different actions and opinions, a mixed methods survey was designed to collect qualitative information and quantitative data about specific habits, in addition to demographic

and educational information. The survey asked students various questions including personal recycling habits, reasons for their actions, and opinions about local water quality. Upon initial exploratory data analysis, it was concluded that many survey questions could have been worded differently to gather more specific responses. Additionally, response error occurred on some questions. For instance, a number of respondents answered their college as the University of Oklahoma rather than their college within the university. Responses were collected randomly at the Student Union and the South Oval on campus. The locations provided a large selection of diverse students. However, voluntary bias may exist due to several students only agreeing to complete the survey after being informed about the topic. Feedback included responses such as: "Sure I will take it. I love the Earth." Plus, questions about diet (e.g. meat eating, vegan, vegetarian, pescatarian) may have been influenced by a lack of vegan or vegetarian food choices in the Student Union. Answers to open-ended questions were interpreted and grouped into categories. A few survey questions were omitted from the final analysis due to question design errors resulting in irrelevant or invalid answers. For example, a typographical error on the opinion rating scale for the question about the likelihood of the student purchasing an electric vehicle resulting in two choices for very likely and not a choice for very unlikely.

To examine factor that may influence student pro-environmental behavior, multiple statistical tests were used, including Analysis of variance (ANOVA), Chi-Square, One Sample T-Test, Independent Two Sample T-Test, and Multiple Regression. Each test was selected based on the type of variable or variables (qualitative or quantitative) in an attempt to evaluate the claim of a specific hypothesis. The hypothesis and assumptions for each test are noted before the test outputs and conclusions. For most tests, the assumptions include normality of the data and that

the data was drawn from a random sample. In the cases that the chosen test was found to be inappropriate by not meeting the required assumptions, conclusions or interesting patterns were drawn from output tables or bar charts.

Results and Analysis

The first test analyzes if a relationship exists between percent of trash recycled by students and student classification categories. The values for percent of trash recycled were grouped into two categories, less than 40% and 40% or more. Initially, I expected a relationship to exist between percent of trash recycled by students and student classification advancement, due to heightened student familiarity with recycle facilities and awareness of university and community recycling efforts. The method for analyzing the relationship is the Chi-Square test. The assumption for this test is that less than 20% of the cells have expected counts less than 5.

Null Hypothesis: There is not a relationship between the percent of trash recycled and student classification.

Alternative Hypothesis: There is a relationship between the percent of trash recycled and student classification.

Chi-Square Test:

PercentRecycled * NewClass Crosstabulation

Count

		NewClass				
		1	2	3	4	Total
PercentRecycled	1	20	25	18	14	77
	2	3	3	6	9	21
Total		23	28	24	23	98

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.332[a]	3	.062
Likelihood Ratio	7.177	3	.066
Linear-by-Linear Association	6.029	1	.014
N of Valid Cases	98		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 4.93.

The first Chi-Square test was invalid because the test violated the 20% rule of cells with expected counts less than 5. So, student classifications were further with freshman and sophomore = 1, and junior and senior = 2, creating a 4 by 4 table.

PercentRecycled * Classification Crosstabulation

Count

		Classification		
		1	2	Total
PercentRecycled	1	45	32	77
	2	6	15	21
Total		51	47	98

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.899[a]	1	.015		
Continuity Correction[b]	4.762	1	.029		
Likelihood Ratio	6.027	1	.014		
Fisher's Exact Test				.025	.014
Linear-by-Linear Association	5.838	1	.016		
N of Valid Cases	98				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.07.

b. Computed only for a 2x2 table

Conclusion: By grouping student classification into 2 categories comprising upperclassmen and underclassmen, the Chi-Square test is appropriate as 0 cells have expected count less than 5. The significance value is less than 0.05, therefore, the conclusion is to reject the null hypothesis. So, it can be deduced with 95% confidence that there is a relationship between the percent of trash recycled and student classification.

This test attempts to determine whether a relationship exists between gender and eating meat. Students were asked how many times a week they eat meat, which provided categorical answers of yes or no, as well as quantitative answers about the student's frequency of eating meat. For this analysis, the categorical variables were used in a Chi-Square test. The assumption for this test is that less than 20% of the cells have expected counts less than 5.

Null Hypothesis: There is not a relationship between gender and eating meat.

Alternative Hypothesis: There is a relationship between gender and eating meat.

Chi-Square Test:

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.657[a]	1	.418		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	1.008	1	.315		
Fisher's Exact Test				1.000	.606
N of Valid Cases	99				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .39.

b. Computed only for a 2x2 table

Conclusion: Unfortunately, only 1 out of the 100 students surveyed did not eat meat, and 50% of the cells have expected count less than 5, so the Chi-Square test is inconclusive.

This test seeks to determine how far OU students are willing to walk to find a recycling bin. The test is a One Sample T-Test, which tests the mean distance students are willing to walk to find a recycling bin against the test value of 20 feet. The assumptions for the test include that the sample was drawn from randomly and the sample size is greater than 30 to satisfy the Central Limit Theorem.

Null Hypothesis: The mean distance OU students on campus will walk to find a recycling bin is 20 feet.

Alternative Hypothesis: The mean distance OU students on campus will walk to find a recycling bin is farther than 20 feet.

One Sample T-test:

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Distance	99	313.14	1285.641	129.212

One-Sample Test

	Test Value = 20					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Distance	2.269	98	.025	293.141	36.72	549.56

Conclusion: The test reveals that the significance value is less than 0.05, therefore, the conclusion is to reject the null hypothesis. With 95% confidence, the claim is supported that the mean distance OU students are willing to walk on campus to find a recycling bin is a different from 20 feet. The test table shows that the 95% confidence interval is a large and that the true population mean is between 36.72 feet and 549.56 feet. Therefore, distance OU students are willing to walk on campus to find a recycling bin is greater than 20 feet.

The next two test attempt to examine whether a relationship exists between gender and recycling, both on campus and off campus. The surveyed asked for a "yes" or "no" answer to whether student recycled on and off campus. The test for these two categorical variables is the Chi-Square Test. The assumption for this test is that less than 20% of the cells have expected counts less than 5.

Null Hypothesis: There is not a relationship between gender and on campus recycling.

Alternative Hypothesis: There is a relationship between gender and on campus recycling.

Chi-Square Test:

Gender * OnCampusRecycing Crosstabulation

Count

		OnCampusRecycing		
		No	Yes	Total
Gender	Female	14	26	40
	Male	14	46	60
Total		28	72	100

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.620[a]	1	.203		
Continuity Correction[b]	1.093	1	.296		
Likelihood Ratio	1.602	1	.206		
Fisher's Exact Test				.257	.148
N of Valid Cases	100				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.20.

b. Computed only for a 2x2 table

The Chi-Square test is appropriate because less than 20% of the cells have expected count less than 5. The Chi-Square Test shows that the p-value is greater than 0.05, therefore, the conclusion is fail to reject the null hypothesis. So, with 95% confidence, it is concluded that there is not enough evidence to support the claim that a relationship exists between gender and on campus recycling. However, while not statistically significant, the cross tabulation table shows that a larger proportion of the males answered yes to recycling on campus, than females, with 76% of males answering yes and 65% of females answering yes.

Chi-Square Test:

Null Hypothesis: There is not a relationship between gender and off campus recycling.

Alternative Hypothesis: There is a relationship between gender and off campus recycling.

Gender * OffCampusRecycling Crosstabulation

Count

		OffCampusRecycling		
		No	Yes	Total
Gender	Female	21	19	40
	Male	24	36	60
Total		45	55	100

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.515[a]	1	.218		
Continuity Correction[b]	1.052	1	.305		
Likelihood Ratio	1.515	1	.218		
Fisher's Exact Test				.228	.153

N of Valid Cases	100				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 18.00.					
b. Computed only for a 2x2 table					

Conclusion: Similarly, the Chi-Square test for gender and off campus recycling is appropriate because less than 20% of the cells have expected count less than 5. The Chi-Square Test shows that the p-value is greater than 0.05, therefore, the conclusion is fail to reject the null hypothesis. So, with 95% confidence, it is concluded that there is not enough evidence to support the claim that a relationship exists between gender and off campus recycling. Again, while not statistically significant, the cross tabulation table shows that a larger proportion of the males answered yes to recycling off campus than females, with 60% of males answering yes and 47.5% of females answering yes.

This test is to ascertain whether a relationship exists between OU student's opinion of Norman's water quality based on safety and OU student's opinion of Norman's water quality based on taste. The test is the Chi-Squared Test. Before the test, the answers for the two survey questions were grouped from 5 categories to 3 categories. The answers for the question about water safety were grouped as follows: dangerous, unsafe = 1, acceptable = 2, safe, very safe = 3. The answers for the question about water taste were grouped as follows: horrible, bad = 1, okay = 2, good, great = 3.

Null Hypothesis: There is not a relationship between student's opinion of Norman's water quality based on safety and student's opinion of Norman's water quality based on taste.

Alternative Hypothesis: There is a relationship between student's opinion of Norman's water quality based on safety and student's opinion of Norman's water quality based on taste.

Chi-Square Test:

TasteWater * SafeWater Crosstabulation

Count

		SafeWater			
		1	2	3	Total
TasteWater	1	28	19	10	57
	2	7	10	13	30
	3	2	2	8	12
Total		37	31	31	99

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.625[a]	4	.004
Likelihood Ratio	15.537	4	.004
Linear-by-Linear Association	13.507	1	.000
N of Valid Cases	99		

a. 3 cells (33.3%) have expected count less than 5. The minimum expected count is 3.76.

Even with the grouping of answers, 68% of the cells have expected count less than 5 making the Chi-Square test inconclusive. So, the answered were regrouped to create only two categories per variable such that horrible, bad = 1, okay, good, great = 2 for taste and dangerous, unsafe = 1 and acceptable, safe, very safe = 2 for safety. Then, the Chi-Square test was attempted again.

Chi-Square Test:

Water Taste * Water Safe Crosstabulation				
Count				
		Water Safe		
		1	2	Total
Water Taste	1	28	29	57
	2	9	33	42
Total		37	62	99

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.924[a]	1	.005		
Continuity Correction[b]	6.785	1	.009		
Likelihood Ratio	8.215	1	.004		
Fisher's Exact Test				.006	.004
Linear-by-Linear Association	7.844	1	.005		
N of Valid Cases	99				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.70.					
b. Computed only for a 2x2 table					

Conclusion: The second test was conclusive with 0 cells having expected count less than 5. The test shows that the significance value is less than 0.05. Therefore, the conclusion is to reject then null hypothesis and conclude with 95% confidence that a there is a relationship between student's opinion of Norman's water quality based on safety and student's opinion of Norman's water quality based on taste.

This test aims to determine whether a relationship exists between student plastic water bottle consumption and student's opinion of water quality based on safety. To test the relationship the Independent Two Sample T-test is used to test whether the means of student plastic water bottle consumption differs across the categories of student opinion of water quality based on safety. Before the test, it was expected that student opinion of water quality would influence plastic water bottle consumption. The answers for students opinion of water quality based on safety were grouped so that dangerous, unsafe = 1 and acceptable, safe, very safe = 2. The assumption for the test is that the sample size is greater than 30 to satisfy the Central Limit Theorem.

Null Hypothesis: The means of student plastic water bottle consumption do not differ significantly across the categories of student opinion of water quality based on safety.

Alternative Hypothesis: The means of student plastic water bottle consumption do differ significantly across the categories of student opinion of water quality based on safety.

Two Sample T-Test:

Group Statistics

	Water Safe	N	Mean	Std. Deviation	Std. Error Mean
DisposableBottles	1	36	3.56	5.639	.940
	2	61	4.13	6.001	.768

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
DisposableBottles	Equal variances assumed	.100	.753	-.467	95	.642	-.576	1.234	-3.025	1.874

	Equal variances not assumed			-.474	77.287	.637	-.576	1.214	-2.993	1.842

Conclusion: The significance value of 0.642 is greater than 0.05 and the decision is fail to reject the null hypothesis. Therefore, with 95% confidence, it is concluded that there is not enough evidence to support the claim that the means of student plastic water bottle consumption differ significantly across the categories of student opinion of water quality based on safety.

Similar to the previous test, this test also aims to determine whether a relationship exists between student plastic water bottle consumption and student's opinion of water quality based on taste. The survey question asked students how many disposable water bottles they consume per week. To test the relationship the Independent Two Sample T-test is used to test whether the means of student plastic water bottle consumption differs across the categories of student opinion of water quality based on taste. Before the test, it was expected that student opinion of water quality would influence plastic water bottle consumption. The answers for opinion of water quality based on taste were grouped so that horrible, bad = 1, and okay, good, great = 2. The assumption for the test is that the sample size is greater than 30 to satisfy the Central Limit Theorem.

Null Hypothesis: The means of student plastic water bottle consumption do not differ significantly across the categories of student opinion of water quality based on taste.

Alternative Hypothesis: The means of student plastic water bottle consumption do differ significantly across the categories of student opinion of water quality based on taste.

Two-sample T-Test:

Group Statistics

	Water Taste	N	Mean	Std. Deviation	Std. Error Mean
DisposableBottles	1	56	4.50	6.419	.858
	2	42	3.17	4.874	.752

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
DisposableBottles	Equal variances assumed	2.032	.157	1.124	96	.264	1.333	1.186	-1.021	3.687
	Equal variances not assumed			1.169	95.978	.245	1.333	1.141	-.931	3.598

Conclusion: The test shows that the significance value of 0.264 is greater than 0.05, so the conclusion is fail to reject the null hypothesis. Therefore, with 95% confidence, it is concluded that there is not enough evidence to support the claim that the means of student plastic water bottle consumption differ significantly across the categories of student opinion of water quality based on taste.

This test is to determine whether a relationship exists between the student climate change belief and home state affiliation. The test is Chi-Square. To conduct the test, the answers for home state were grouped so that Oklahoma was one category and all other states were another category. Also, the answers for climate change belief were grouped so that strongly disagree and disagree = 1 and indifferent, agree, and strongly agree = 2. The assumption for the test is that less than 20% of the cells have an expected count less than 5.

Null Hypothesis: There is not a relationship between student climate change belief and home state affiliation.

Alternative Hypothesis: There is a relationship between student climate change belief and homes state affiliation.

Chi-Square Test:

HomeState * ClimateChange Crosstabulation				
Count				
		ClimateChange		
		1.00	2.00	Total
HomeState	Oklahoma	4	57	61
	Other	0	38	38
Total		4	95	99

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.597[a]	1	.107		
Continuity Correction[b]	1.181	1	.277		
Likelihood Ratio	3.978	1	.046		
Fisher's Exact Test				.295	.139
N of Valid Cases	99				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.54.

b. Computed only for a 2x2 table

Conclusion: The Chi-Square test is inconclusive because more than 20% of the cells have expected count less than 5. However, while not statistically significance, the cross tabulation table shows that 93.4% of the sample either are indifferent, agree, and strongly agree with climate change, and of the students surveyed from other states, 0 (zero) disagree or strongly disagree with climate change.

This test is to examine the mean number of environmental classes taken by students. The test is a One Sample T-Test to compare the mean number of classes to the test value of 3. The assumption for the test is that the sample size is greater than 30.

Null Hypothesis: The mean number of environmental classes taken by students is 3.

Alternative Hypothesis: The mean number of environmental classes taken by students is different from 3.

One Sample T-Test:

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
EnvironClasses	100	.93	2.105	.210

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
EnvironClasses	-9.836	99	.000	-2.070	-2.49	-1.65

Conclusion: The test results show that the Significance value is less than 0.05, therefore, it is concluded to reject the null hypothesis, and with 95% confidence it is confirmed that the mean number of environmental classes taken by students is different from 3. The test shows that mean number of environmental classes taken by students is around 1.

This test is to test whether a relationship exists between a student's political affiliation and a student's reason for recycling on campus. Before the test, it was expected that Democrats and Independents would recycle for environmental concerns more than Republicans. The responses for the open-ended questions about reasons for recycling on campus were interpreted and grouped into 4 categories including: environmental concern, moral obligation, convenience, and inconvenience. The test is the Chi-Square Test. The assumption for the test is that less than 20% of the cells have an expected count less than 5.

Null Hypothesis: There is not a relationship between political affiliation and reason for recycling on campus.

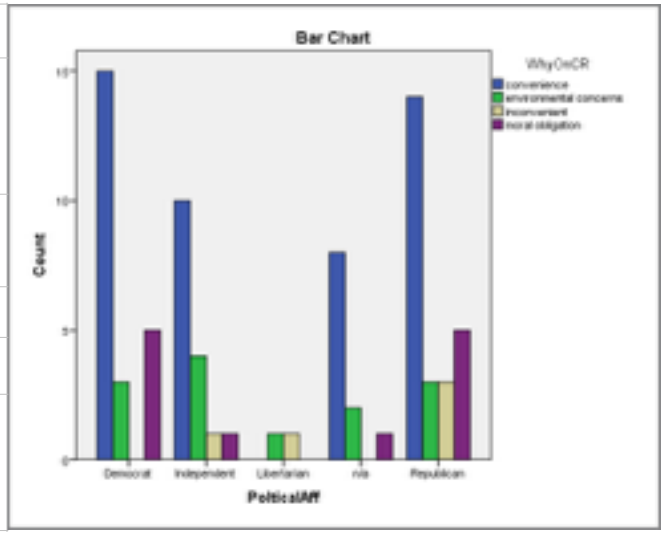
Alternative Hypothesis: There is a relationship between political affiliation and reason for recycling on campus.

Chi-Square Test:

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.713[a]	12	.205
Likelihood Ratio	15.470	12	.217
N of Valid Cases	77		

a. 16 cells (80.0%) have expected count less than 5. The minimum expected count is .13.



Conclusion: The test is inconclusive because more than 20% of the cells have expected count less than 5. Further, the answers could not reasonably grouped to attempt to make the test valid. However, while not statistically significant, the bar chart shows that for Democrats, Independents, Republicans, and those without a political affiliation, the greatest reason for recycling on campus is convenience. For Libertarians, the reason is equal inconvenience and environmental concern. The second largest factor influencing recycling for the two major political affiliations, Democrat and Republican, is moral obligation, and environmental concern is the smallest factor. The reasons for recycling on campus for Democrats and Republicans seem relatively similar.

This test attempts to determine whether a relationship exists between coming from a family that recycled and recycling on campus. Before the test, it was expected that students that came from a family that recycled would recycle on campus. The test is the Chi-Square Test. The assumption for the test is that less than 20% of the cells have an expected count less than 5.

Null Hypothesis: There is not a relationship between coming from a family that recycled and recycling on campus.

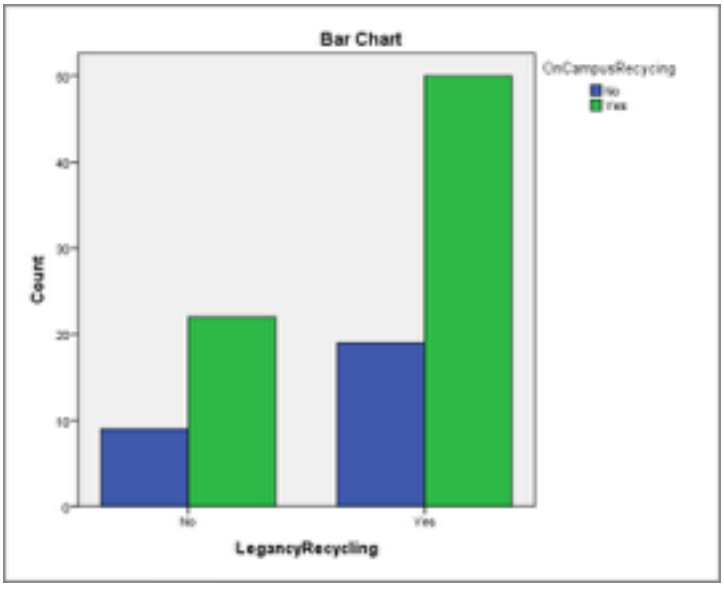
Alternative Hypothesis: There is a relationship between coming from a family that recycled and recycling on campus.

Chi-Square Test:

LegancyRecycling * OnCampusRecycing Crosstabulation

Count

		OnCampusRecycing		
		No	Yes	Total
LegancyRecycling	No	9	22	31
	Yes	19	50	69
Total		28	72	100



Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.024[a]	1	.878		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.024	1	.878		
Fisher's Exact Test				1.000	.529
N of Valid Cases	100				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.68.

b. Computed only for a 2x2 table

Conclusion: The test is valid because 0 cells have expected count less than 5. The test shows that the significance value is greater than 0.05. The conclusion is fail to reject the null hypothesis, therefore, with 95% confidence it is concluded that there is not enough evidence to support the claim there is a relationship between coming from a family that recycled and recycling on campus. However, while not statistically significant, the bar chart below that the count of students that come from a home that recycled and also recycle on campus is significantly greater than those that come from a home that recycled and do not recycle on campus.

This test is to determine whether a relationship exists between coming from a family that recycled and the percent of trash recycled by the student. Because the answers for percent of trash recycled were grouped onto two categories: less than 50% = 1, and 50% or great = 2. It was expected that coming from a family that recycled would result in a greater percent of trash recycled. The assumption for the test is that less than 20% of the cells have an expected count less than 5.

Null Hypothesis: There is not a relationship between coming from a family that recycled and percent of trash recycled.

Alternative Hypothesis: There is a relationship between coming from a family that recycled and percent of trash recycled.

Chi-Square Test:

LegancyRecycling * PercentRecycled Crosstabulation

Count

		PercentRecycled		
		1	2	Total
LegancyRecycling	No	26	5	31
	Yes	52	17	69
Total		78	22	100

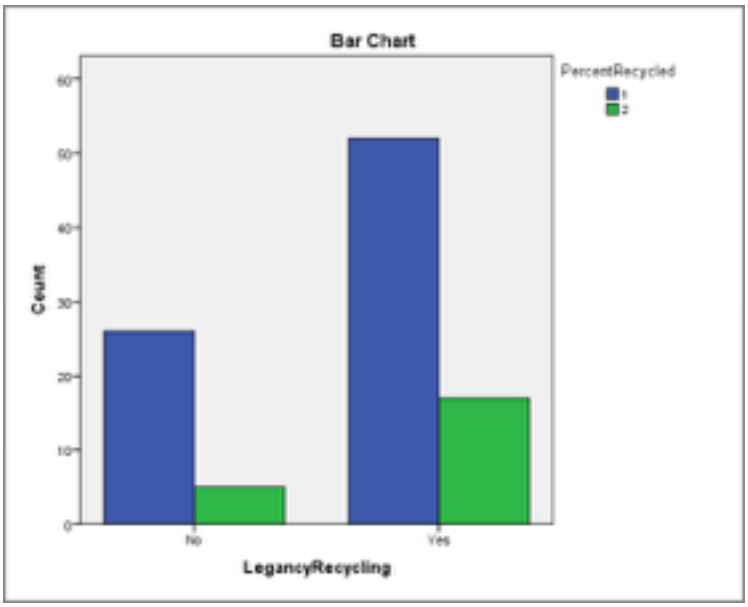
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.902[a]	1	.342		
Continuity Correction[b]	.475	1	.491		
Likelihood Ratio	.942	1	.332		
Fisher's Exact Test				.438	.249
N of Valid Cases	100				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.82.

b. Computed only for a 2x2 table

Conclusion: The test is valid because 0 cells have expected count less than 5. The significance value is greater than 0.05, therefore, the conclusion is fail to reject the null hypothesis. With 95% confidence, it can be concluded that there is not enough evidence to support the claim that there is a relationship between coming from a family that recycled and percent of trash recycled. However, it is interesting that the bar chart below shows that of the students that come from a home that recycled a larger number recycle less than 50% of trash than those that recycle 50% or more.



This test is to verify whether a relationship exists between residence and the percent of trash recycled by students. Because percent of trash recycled was grouped into less than 50% and 50% or greater and residence was grouped into off campus = 1 and on campus = 2, the test is Chi-Square. The assumption for the test is that less than 20% of the cells have an expected count less than 5.

Null Hypothesis: There is not a relationship between residence and percent recycled.

Alternative Hypothesis: There is a relationship between residence and percent recycled.

Residence * PercentRecycled Crosstabulation

Count

		PercentRecycled		
		1	2	Total
Residence	1.00	55	19	74
	2.00	20	3	23
Total		75	22	97

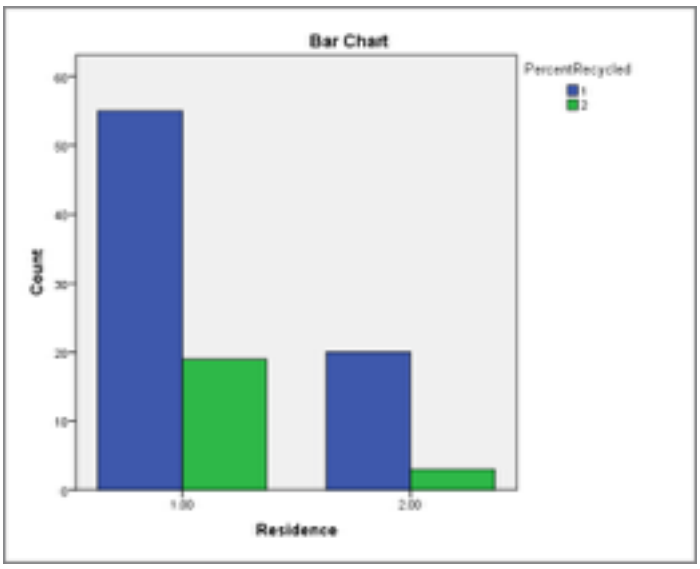
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.597[a]	1	.206		
Continuity Correction[b]	.958	1	.328		
Likelihood Ratio	1.747	1	.186		
Fisher's Exact Test				.263	.164
Linear-by-Linear Association	1.580	1	.209		
N of Valid Cases	97				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.22.

b. Computed only for a 2x2 table

Conclusion: The test is conclusive because 0 cells have an expected count less than 5. The significance value is greater than 0.05, therefore, the conclusion is fail to reject the null hypothesis. With 95% confidence, it is concluded that there is not enough evidence to support the claim there is a relationship between residence and percent recycled. But, the cross tabulation table and bar chart below shows that more of the students that live off campus recycle less than 50% of trash than those that recycle 50% or more.



This test is to determine whether there is a relationship between OU student's opinion of Norman's water quality based on safety and home state. The home state answers were grouped into two groups: Oklahoma and Other. Water safety answers were grouped into dangerous, unsafe = 1, acceptable = 2, and safe, very safe = 3. The test is Chi-Square. The assumption for the test is that less than 20% of the cells have an expected count less than 5.

Null Hypothesis: There is not a relationship between OU student's opinion of Norman's water quality based on safety and home state affiliation.

Alternative Hypothesis: There is a relationship between OU student's opinion of Norman's water quality based on safety and home state affiliation.

Chi-Square Test:

HomeState * SafeWater Crosstabulation

Count

		SafeWater			
		1	2	3	Total
HomeState	Oklahoma	22	18	21	61
	Other	15	13	10	38
Total		37	31	31	99

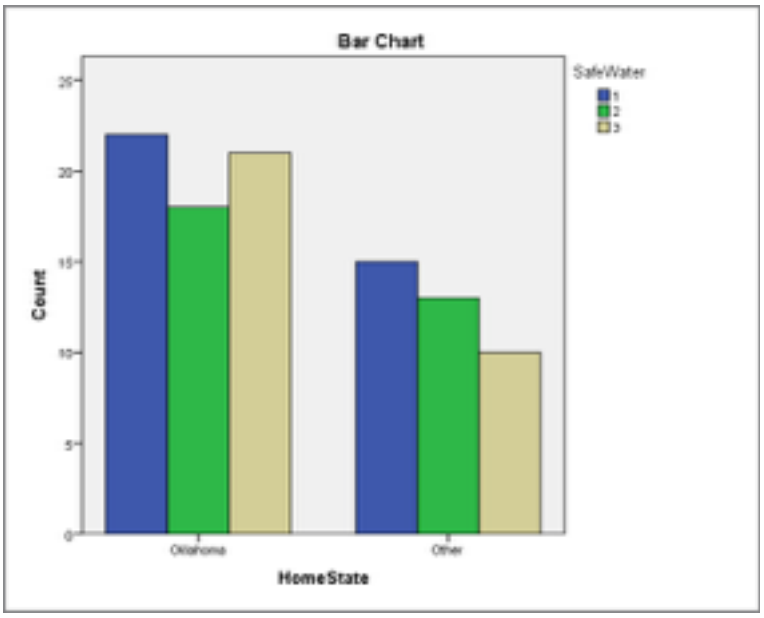
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.730[a]	2	.694
Likelihood Ratio	.739	2	.691
N of Valid Cases	99		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.90.

Conclusion: The test is conclusive because 0 cells have an expected count less than 5. The significance value is greater than 0.05, therefore, the conclusion is fail to reject the null

hypothesis. With 95% confidence, it is concluded that there is not enough evidence to support the claim there is a relationship between OU student's opinion of Norman's water quality based on safety and home state affiliation. However, the cross tabulation table and the bar chart show that more students from Oklahoma and out-of-state perceive the water in Norman to be either unsafe or very unsafe than those who view the water as acceptable, safe, or very safe.



This test is to determine whether there is a correlation between the percent of trash recycled by students and other quantitative variables: meat consumption per week, number of water filters purchased per year, number of disposable plastic water bottles consumed per week, number of environmental classes taken, number of times a student carpools per week, the number of times a student unplugs power cords each day, the number of times a student uses reusable bags per week, the number of times per week a student uses reusable beverage containers, the distance willing to walk to find a recycling bin, GPA, and age. The test is multiple regression. The assumptions are that the variables were drawn from a random sample and that the residuals are normally distributed.

Conclusion: The test of normality for the residuals are not normally distributed (significance value less than 0.05). Therefore, the multiple regression test is inappropriate.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.190	100	.000	.874	100	.000

a. Lilliefors Significance Correction

This test is to examine whether the mean number of water filters purchased per year by students differs across the categories of the student's opinion of water quality based on taste. It is often recommended that water filters be replaced every 3 months for a total purchasing filters 4 times per year. The test is an Independent two sample t-test. The answers for water taste were grouped into two categories. The assumption for the test is that the sample size is greater than 30.

Null Hypothesis: The means of the amount of water filters purchased per year by students do not differ across the categories of opinion of water taste.

Alternative Hypothesis: The means of the amount of water filters purchased per year by students do differ across the categories of opinion of water taste.

Group Statistics

	Water Taste	N	Mean	Std. Deviation	Std. Error Mean
WaterFilters	1	57	3.39	7.091	.939
	2	43	1.33	2.222	.339

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Water Filters	Equal variances assumed	3.093	.082	1.844	98	.068	2.069	1.122	-.157	4.296
	Equal variances not assumed			2.072	69.951	.042	2.069	.999	.078	4.061

Conclusion: The significance value is greater that 0.05. Therefore, the conclusion is fail to reject the null hypothesis. With 95% confidence, it is concluded that there is not enough evidence to claim that the means of the amount of water filters purchased per year by students differ across the categories of opinion of water taste.

This test is to examine whether the mean number of water filters purchased per year by students differs across the categories of the student's opinion of water quality based on safety. It is often recommended that water filters be replaced every 3 months for a total purchasing filters 4 times per year. The test is an Independent two sample t-test. The answers for water safety were grouped into two categories. The assumption for the test is that the sample size is greater than 30.

Null Hypothesis: The means of the amount of water filters purchased per year by students do not differ across the categories of opinion of water safety.

Alternative Hypothesis: The means of the amount of water filters purchased per year by students do differ across the categories of opinion of water safety.

Group Statistics

	Water Safe	N	Mean	Std. Deviation	Std. Error Mean
WaterFilters	1	37	4.28	8.606	1.415
	2	62	1.48	2.119	.269

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
WaterFilters	Equal variances assumed	8.409	.005	2.448	97	.016	2.800	1.144	.530	5.070
	Equal variances not assumed			1.944	38.623	.059	2.800	1.440	-.114	5.714

Conclusion: The significance value is less than 0.05. Therefore, the conclusion is to reject the null hypothesis. With 95% confidence, it is concluded that the means of the number of water filters purchased per year by students do differ across the categories of opinion of water safety.

This final test is to determine whether there is a relationship between consumption of disposable plastic bottle per week and belief in climate change. The survey asked students how strongly they agree with climate change on a scale from 1 to 5 (1 = strongly disagree, 5 = strongly agree). The test is ANOVA. Assumptions are that the variables were drawn from a random sample and homogeneity of variance.

Null Hypothesis: The mean amount of disposable plastic bottles used per week do not differ across the categories of climate change opinion.

Alternative Hypothesis: The mean amount of disposable plastic bottles used per week differ across the categories of climate change opinion.

Test of Homogeneity of Variances

DisposableBottles

Levene Statistic	df1	df2	Sig.
.402	1	96	.527

ANOVA

DisposableBottles

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.793	1	5.793	.170	.681
Within Groups	3276.707	96	34.132		
Total	3282.500	97			

Robust Tests of Equality of Means

DisposableBottles

	Statistic[a]	df1	df2	Sig.
Brown-Forsythe	.384	1	3.654	.572

a. Asymptotically F distributed.

Conclusion: The significance value for the test of homogeneity is greater than 0.05, so the assumption is satisfied. The significance value for the ANOVA test is greater than 0.05, so it is concluded to fail to reject the null hypothesis. With 95% confidence, there is not enough evidence to support the claim that the mean amount of disposable plastic bottles used per week differ across the categories of climate change opinion.

Qualitative

An often overlooked environmental issue is modern clothing consumption. Claudio Luz, author of "Waste Couture: Environmental Impact of the Clothing Industry," compares the current practices of the clothing industry to the fast food industry, with environmental and social problems proportionate to that of the oil and gas industry. One survey question simply asked students how many times per year they purchase new clothes. A follow-up question should have been asked about their methods of disposal of old clothes. Responses varied widely from weekly to not often. Valid responses were categorized by frequency. The results showed that 20% of students purchase new clothing twice a month, 20% of students purchased new clothing twice a year, 12% of students answered monthly, 12% of students answered once per semester, 8% of students answered once every 3 months, and only 4% answered weekly.

Summary

For the majority of tests attempted, the tests either did not meet the required assumptions or the conclusions were fail to reject the null hypothesis. For these tests, while not statistically significant, interesting observations were derived from tables and bar charts. On the other hand, several tests were conclusive and resulted in the rejection of the null hypothesis, indicating a relationship exists between the variables.

While only six tests resulted in a rejection of the null hypothesis and support for the claim being tests, interesting conclusions were established. For example, it is interesting that student's opinion of Norman's water quality based on safety is related to their opinion of Norman's water quality based on safety. Another key finding is that, while a relationship could not be supported between the number of water filters purchased per year by students and opinion of water taste, a relationship does exist between the number of water filters purchased per year and student's opinion of water quality based on safety. In other words, perception of local water safety is a key

factor in water filter purchases. Furthermore, analysis of survey answers concluded that there is a relationship between the percent of trash recycled and student classification. Underclassmen, Freshman and Sophomore students, often answered a lower percent of trash recycled than upperclassmen. Therefore, providing incoming freshman with information about recycling locations on campus and the university's recycling goals may further reduce the amount of solid waste generated by the university. Additionally, it was found that the range of distances students are willing to walk to find a recycling bin is large, with a mean distance between 36.72 feet and 549.56 feet. It was also found that the greatest factor influencing recycling on campus is convenience. Therefore, the university could boost the success of the recycling program by providing more recycling bins on campus that are in convenient locations within close proximity to most students walking paths. Further observational research about the most traveled walking paths on campus would also be beneficial. Finally, survey response analysis determined that the mean number of environmental classes is less than 1.

Overall, conclusive and statistically significant results at the 95% confidence level confirm that the key factors that may be impacting pro-environmental behavior of OU students include student classification and convenient locations of recycling bins. Initial analysis of survey responses highlighted flaws in the design of many survey questions. For example, the survey should have asked about the student's major and/or minor. Additionally, many open-ended questions should have been worded more clearly or even provided an example of the type of answer that the question requested. Some survey questions that asked for "how many times per week…" could be restated "how many days per week…". Also, a larger sample size could have resulted in more conclusive Chi-Square Tests.

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