

PSYCHOLOGY 320L
 Problem Set #6: Chi-Square and Correlation/Regression

Name: _____

Score: _____

1. Recent studies have demonstrated that naltrexone, a drug that reduces the craving for heroin, can prevent relapse of drinking in alcoholics (Volpicelli et al., 1992). Suppose that you studied a group of alcoholics who were receiving counseling and were currently abstaining from drinking. One-third of the people also received a small dose of naltrexone, one-third received a larger dose, and the remainder received a placebo. You obtained the following data, which show the number of people in each group that relapsed (began drinking heavily again) and the number of people that did not relapse.

Response Category	Placebo	Small Dose	Large Dose
Relapse	20	10	6
No Relapse	10	20	24

- State what the independent variable is and what the dependent variable is.
- State the null hypothesis and the alternative hypothesis.
- Calculate the degrees of freedom and state the decision rule for $\alpha = .05$.
- Calculate the χ^2 (by hand and by computer).
- State your decision and write your conclusion.
- Calculate the effect size and state what it means in words.
- Conduct a planned comparison to determine whether those receiving the large dose are significantly less likely to relapse than those receiving the placebo using $\alpha = .05$. Be sure to state your hypotheses, state the decision rule, calculate the χ^2 for the comparison, state the decision, and write your conclusion.
- Conduct a planned comparison to determine whether those receiving any dose are significantly less likely to relapse than those receiving the placebo using $\alpha = .05$. Be sure to state your hypotheses, state the decision rule, calculate the χ^2 for the comparison, state the decision, and write your conclusion.

1. Relapse * Dose Crosstabulation

			Dose			Total
			Placebo	Small	Large	
Relapse	Relapse	Count				
		Expected Ct.				
	No Relapse	Count				
		Expected Ct.				
Total		Count				
		Expected Ct.				

Chi-Square Tests

	Value	df	Sig.
Pearson Chi-Square			

Symmetric Measures

	Value	Approx. Sig.
Phi		

2. A study by Cialdini, Reno, and Kallgren (1990) examined how people conform to norms concerning littering. The researchers wanted to determine whether a person's tendency to litter depended on the amount of litter already in the area. People were handed a handbill as they entered an amusement park that already had 0, 1, 2, 4, 8, or 16 handbills lying on the ground. Then the people were observed to determine whether or not they dropped the handbill on the ground. The frequency data are as follows:

Amount of Existing Litter

Response Category	0 or 1 Piece	2 or 4 Pieces	8 or 16 Pieces
Littering	17	28	49
Not Littering	102	91	70

- State what the independent variable is and what the dependent variable is.
- State the null hypothesis and the alternative hypothesis.
- Calculate the degrees of freedom and state the decision rule for $\alpha = .01$.
- Calculate the χ^2 (by hand and by computer).
- State your decision and write your conclusion.
- Calculate the effect size and state what it means in words.
- Conduct a planned comparison to determine whether people litter significantly more when there are 8 or 16 pieces of existing litter than they do when there are 0 or 1 piece of existing litter using $\alpha = .01$. Be sure to state your hypotheses, state the decision rule, calculate the χ^2 for the comparison, state the decision, and write your conclusion.
- Conduct a planned comparison to determine whether people litter significantly more when there are 8 or 16 pieces of existing litter than when there are fewer pieces using $\alpha = .01$. Be sure to state your hypotheses, state the decision rule, calculate the χ^2 for the comparison, state the decision, and write your conclusion.

2. Littering * Amount of Existing Litter Crosstabulation

			Amount of Existing Litter			Total
			0 or 1	2 or 4	8 or 16	
Littering	Littering	Count				
		Expected Ct.				
	Not Littering	Count				
		Expected Ct.				
Total		Count				
		Expected Ct.				

Chi-Square Tests

	Value	df	Sig.
Pearson Chi-Square			

Symmetric Measures

	Value	Approx. Sig.
Phi		

3. Suppose you are planning an experiment for a class project with a group of students and you have reached the point at which you need to decide how many subjects you will assign to each of the treatment conditions. Let's suppose that your group has decided to study the effects of various background noises on ability to solve problems--specifically, silence, soft recorded conversation, light classical music, and musical selections recorded from a local "top-40" radio station. You will determine whether or not different subjects will be able to solve an algebra word problem while under a particular noise condition. Your group expects to find a "large" effect as a result of these manipulations.
- A. Estimate the sample size you will need to achieve a power of .90.
- B. Suppose that you feel a "large" effect is not a realistic estimate and argue for using a "medium" effect to estimate sample size. What sample size will your group need now to achieve the same degree of power?
- C. Let's assume that the sample size calculated in part (B) is simply not possible to achieve by your group given the time available to complete the study. After much argument, a compromise is reached in which the group decides to set the estimated effect size equal to .40. What sample size do you now need?
- D. Some members of your group still feel that steps could be taken to reduce the estimated sample size some more. They suggest that the group could live with a small decrease in power--from .90 to .80. What sample size would you now need, still using an estimated effect size of .40?

4. Thornton (1984) has suggested marital happiness can be measured by simple behavioral indexes: the number of times the couple embraces each other and the number of times they argue. He had 19 couples monitor their frequency of embracing and arguing for 35 consecutive days and then they indicated their perceived marital happiness using a 7-point scale ranging from very unhappy (1) to perfectly happy (7).

Marital Happiness	Embraces	Arguments
5	31	6
7	42	2
3	16	9
6	33	4
7	40	3
5	25	5
2	18	12
4	16	3
5	20	7
4	16	5
7	50	2
6	41	3
1	7	15
3	12	9
5	26	6
2	19	10
6	35	2
5	25	4
5	23	6

- A. Conduct an analysis to determine whether there is a significant correlation between ratings of marital happiness and number of embraces using $\alpha = .05$. Be sure to state your hypotheses, state the decision rule, calculate the correlation coefficient (by hand and on the computer), state the decision, and write your conclusion.
- B. Calculate the effect size and state what it means in words.
- C. Calculate the regression equation, graph it on a scatterplot, and use it to predict how happy a couple will be if they share 35 embraces during the 35 days.
- D. Conduct an analysis to determine whether there is a significant correlation between ratings of marital happiness and number of arguments using $\alpha = .01$. Be sure to state your hypotheses, state the decision rule, calculate the correlation coefficient (by hand and on the computer), state the decision, and write your conclusion.
- E. Calculate the effect size and state what it means in words.
- F. Calculate the regression equation, graph it on a scatterplot, and use it to predict how happy a couple will be if they have 11 arguments during the 35 days.
- G. Do more embracing or less arguing cause happier marriages? Justify your answer.

Problem for Further Practice:

- H. Conduct an analysis to determine whether there is a significant correlation between number of embraces and number of arguments using $\alpha = .05$. Be sure to state your hypotheses, state the decision rule, calculate the correlation coefficient (by hand and on the computer), state the decision, and write your conclusion.
- I. Calculate the effect size and state what it means in words.
- J. Calculate the regression equation, graph it on a scatterplot, and use it to predict how many embraces a couple will share if they have 7 arguments during 35 days.

4A. Descriptive Statistics

	Mean	Standard Deviation	n

Correlations

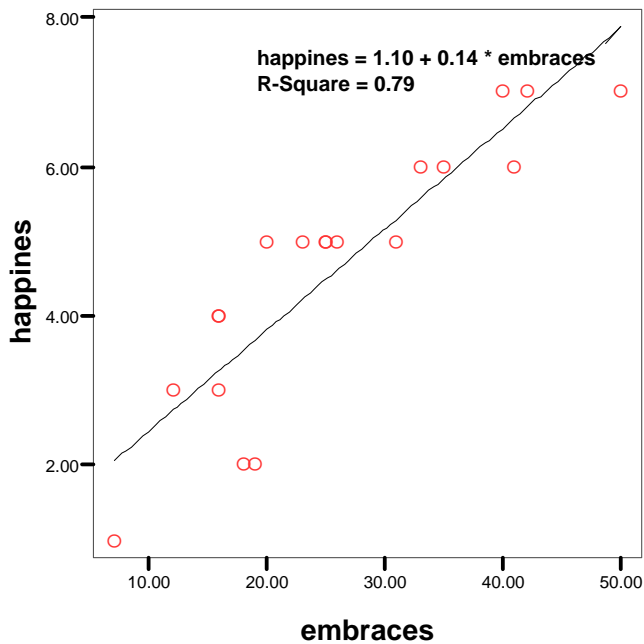
Pearson Correlation			
Sig.			

Model Summary

Model	R	R squared

Coefficients

	B	Standard Error
(constant)		



Linear Regression

4D. Descriptive Statistics

	Mean	Standard Deviation	n

Correlations

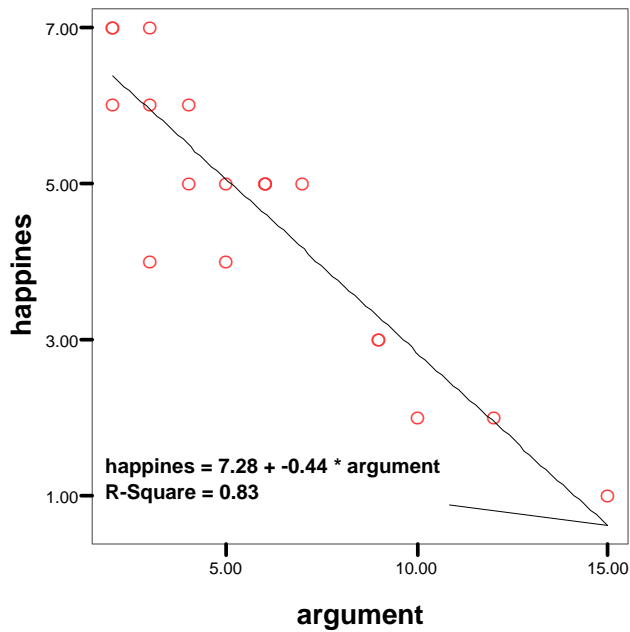
Pearson Correlation			
Sig.			

Model Summary

Model	R	R squared

Coefficients

	B	Standard Error
(constant)		



Linear Regression

5. Suppose you are working on a group project to determine whether there is a relationship between age and attention span. You will test children of varying ages to see how long they can work on a specific task without getting distracted. Your group expects to find a "large" effect as a result of these measurements.
- A. Estimate the sample size you will need to achieve a power of .80.
 - B. Suppose that you feel a "large" effect is not a realistic estimate and argue for using a "medium" effect to estimate sample size. What sample size will your group need now to achieve the same degree of power?
 - C. Let's assume that the sample size calculated in part (B) is simply not possible to achieve by your group given the time available to complete the study. After much argument, a compromise is reached in which the group decides to set the estimated effect size equal to .18. What sample size do you now need?
 - D. Some members of your group still feel that steps could be taken to reduce the estimated sample size some more. They suggest that the group could live with a small decrease in power--from .80 to .70. What sample size would you now need, still using an estimated effect size of .18?

Problem for Further Practice:

6. Friedman and Rosenman (1974) have suggested that personality type is related to heart disease. Specifically, type A people, who are competitive, driven, pressured, and impatient, are more prone to heart disease. On the other hand, type B individuals, who are less competitive and more relaxed, are less likely to have heart disease. Suppose that an investigator would like to investigate this claim. Four groups of individuals, some with no disorder, some with hypertension, some with a vascular disorder, and some with a heart disorder are given tests to determine their personality type. The observed frequencies are as follows:

Response	Type of Disorder			
	Heart	Vascular	Hypertension	None
Category				
Type A	38	29	43	60
Type B	18	22	14	126

- A. State what the independent variable is and what the dependent variable is.
- B. State the null hypothesis and the alternative hypothesis.
- C. Calculate the degrees of freedom and state the decision rule for $\alpha = .05$.
- D. Calculate the χ^2 (by hand and by computer).
- E. State your decision and write your conclusion.
- F. Calculate the effect size and state what it means in words.