

Binary Variable **Logistic Regression** **Model Chi Square**
Odds **Sigmoidal Relationship** **S-Shape Relationship**

What is the difference between probability and odds?

Probability = the ratio of number of occurrences to the total number of possibilities

Odds = the ratio of the number of occurrences to the number of non-occurrences

Probability = (Odds) / (1+Odds)

To check to see if the IV and DVs are in the correct forms for a bivariate logistic regression:

1. Open the "GSS98.sav" data file
2. Click on "Utilities"
3. Choose the variables "OWNGUN" and "POLVIEWS"

Is the IV (POLVIEWS) a bivariate numerical variable? Is the DV (OWNGUN) a nominal categorical variable with two categories?

To perform a test on the bivariate logistic regression of this relationship:

1. Click on "Analyze" at the top of the menu bar
 - a. Choose "Regression"
 - b. Choose "Binary Logistic"
 - c. In the "Dependent" box, select the variable "OWNGUN"
 - d. In the "Covariates" box, select the variable "POLVIEWS"
 - e. Click "OK"
2. What is the B-value (strength and direction of relationship) for these variables?
3. What is the Exp(B) value (the odds ratio)? What does this mean? For each one-unit increase on the political views scale, the odds of owning a gun increases by a factor of 1.21
4. Is the relationship statistically significant?

Making predictions from the output of logistic regression:

What if POLVIEWS = 7?

1. Log-odds = $A + B(X)$; Odds = $\text{Exp}(A+B(X))$
2. Probability = $(\text{Odds}) / 1+(\text{Odds})$
3. Probability = $[\text{Exp}(A + B(X))] / 1 + [\text{Exp}(A + B(X))]$
4. Probability = $[\text{Exp}(-1.379 + .190(7))] / 1 + \text{Exp}(-1.379 + .190(7))]$
5. Probability = $[\text{Exp}(-.049)] / 1 + [\text{Exp}(-.049)]$
6. Probability = $.95 / 1.95 = .49$

In scientific mode, make sure the "Inv" button on the left upper side of the calculator is selected, then enter the number (-.049) and hit "ln"

Do the same above steps to calculate probability if POLVIEWS = 1

Interpretation: Political attitudes are significantly associated with gun ownership. The probability of a very conservative person owning a gun is .49. In comparison, people who are very liberal have a much lower probability (.23) of owning a gun.