UNIVERSITY OF SAN FRANCISCO
CHANGE THE WORLD FROM HERE

Tutorial 25: Single Variable Linear Regression

Description

In this tutorial we will learn how to carry out a linear regression with a single variable. Linear regressions are used to test if one variable statistically significantly predicts another variable.

To demonstrate a linear regression with a single predicting variable we will use two variables. **pol_continuum**, which asks participants to rate how liberal or conservative they are (1 = strongly conservative to 7 = strongly Liberal) and **k_accept** which asks participants the extent to which they agree with the statement: I think Kathy's behavior was acceptable in this situation (1 = strongly disagree to 7 = strongly agree). We will use **pol_continuum** to predict **k_accept,** this will help us answer the question whether someone's political leanings predicts how acceptable they think Kathy's behavior was.

The linear model being tested is:
$Y = \beta X + \alpha$ (population), or $Y = bX + a$ (sample) where
Y is the dependent variable
X is the predictor variable
β / b is the slope of the line or the coefficient indicating how much Y changes for each unit increase in X
α / a is the intercept of the linear regression (not to be confused with the alpha level)

The hypotheses for this test are:
H_0: $\beta = 0$
H_1: $\beta \neq 0$

Note: we are using the datafile ARMF2020_wave1andwave2.omv

Content

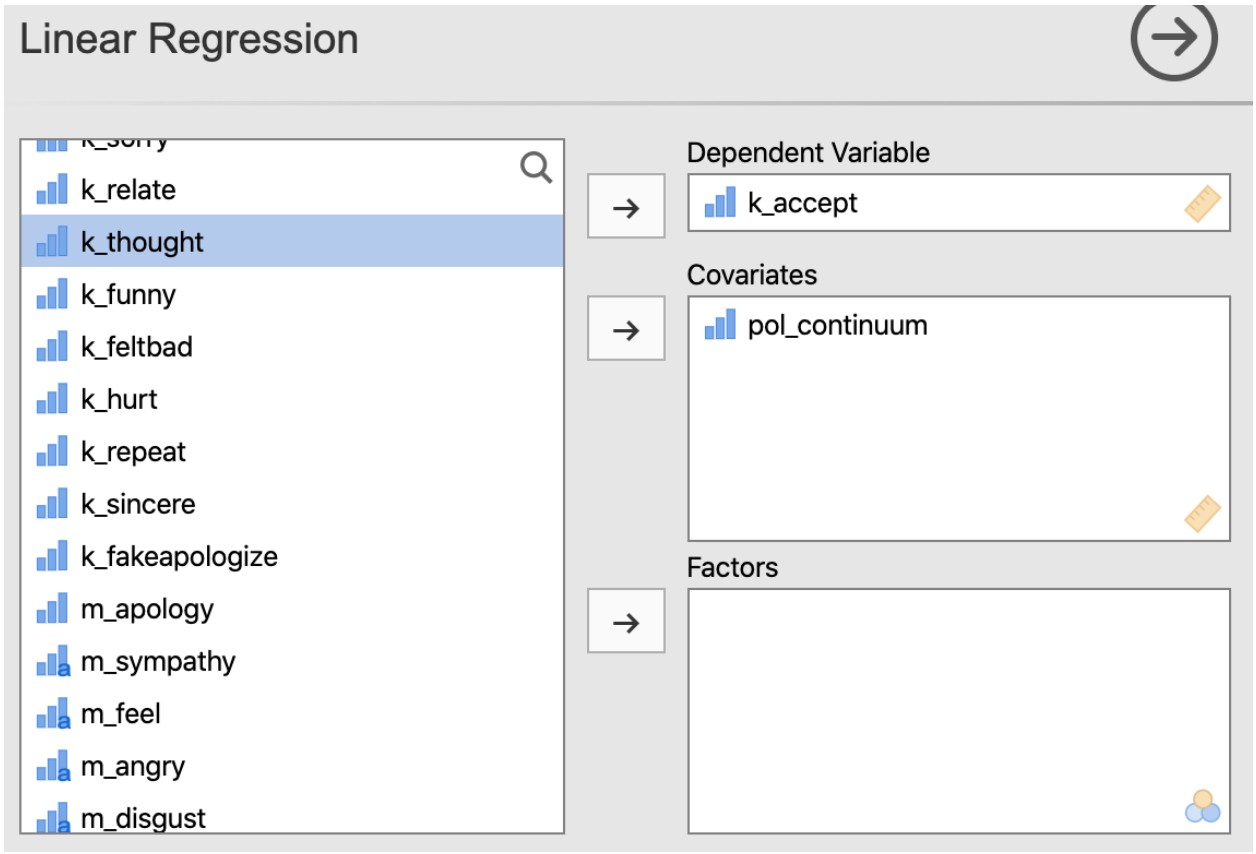
1. **Conduct a linear regression**
2. **Interpret the linear regression output**
3. **APA Format describing the findings**

STEPS

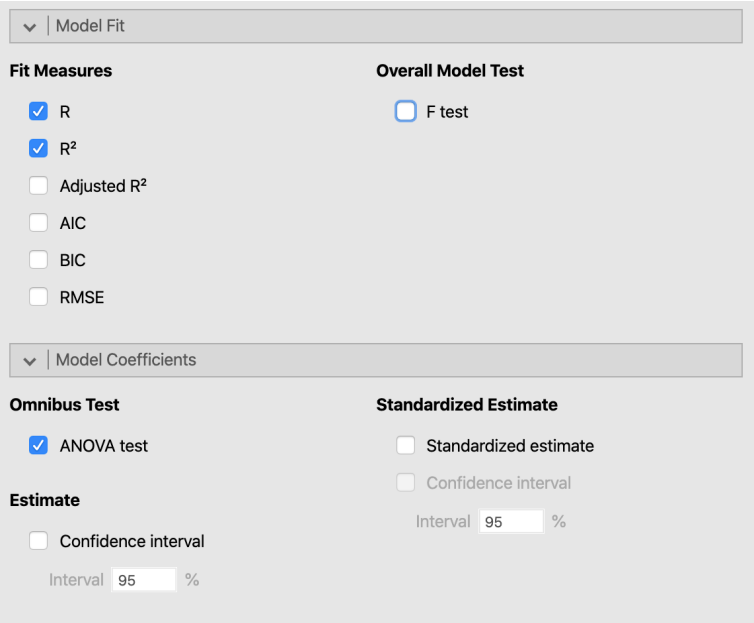
1. **Conduct a linear regression**
    a. Go to the 'Analyses' tab.

b. Click on ‘Regression’.
c. Select ‘Linear Regression’:

d. Move the dependent variable (outcome variable, which in this case is **k_accept** to the dependent variable spot on the right.
e. Move the predictor variable **pol_continuum** to the ‘Covariates’ window on the right. Note. if your predictor variable is not continuous or ordinal/integer but is nominal or ordinal/text then it should be entered in the ‘Factors’ window.



f. Under the variable windows:
   i. Click on the arrow next to ‘Model Fit’ and select **R** and **R^2**
   ii. Click on the arrow next to ‘Model Coefficients’ and select **ANOVA test**



2. Interpret the linear regression output

Linear Regression

Model Fit Measures

Model	R	R^2
1	0.316	0.1000

Omnibus ANOVA Test

	Sum of Squares	df	Mean Square	F	p
pol_continuum	29.1	1	29.12	19.8	<.001
Residuals	262.2	178	1.47		

Note. Type 3 sum of squares

Model Coefficients - k_accept

Predictor	Estimate	SE	t	p
Intercept	3.580	0.3934	9.10	<.001
pol_continuum	−0.304	0.0684	−4.45	<.001

a. Model Fit Measures table
   i. R is the absolute value of the correlation coefficient between the two variables
   ii. R^2 is the percent of variance explained by the model or put another way is the % of variance in **k_accept** that is explained by **pol_continuum**. In this case 10% (.10 x100) of variance in k_accept is explained by pol_continuum.

b. Omnibus ANOVA Test table - tests whether pol_continuum predicts k_accept:

   i. A p-value that is less than .05 indicates that the predictor variable (pol_continuum) is statistically significantly predicting the dependent variable k_accept.

c. Model Coefficients - k_accept table indicates the values of b and a which define the linear regression model so the model can be written as:
Y = -.304X + 3.58 where Y = k_accept, X = pol_continuum
Therefore -.304 can be interpreted such that a unit increase in pol_continuum results in .304 decrease (because of the negative sign) in k_accept. In other words each unit increase in liberalism results in .304 decrease in acceptance of Kathy's behavior.

3. APA Format describing the findings

Findings indicate that the linear model explaining acceptance of Kathy's behavior using participants' political leanings is statistically significant $F(1, 178) = 19.8$, $p < .001$, $R^2 = .10$. Thus, someone's political leaning statistically significantly predicts how accepting they are of Kathy's behavior ($b = -.30$, $p < .001$), such that those who are more liberal are less accepting of Kathy's behavior. Additionally, political leanings explain 10% of variance in acceptance of Kathy's behavior.

----------END TUTORIAL----------

This Jamovi tutorial is a companion to a video tutorial and these materials were developed by:

Aline Hitti, Ph.D., University of San Francisco
Saera Khan, Ph.D., University of San Francisco
Sage Stefanick, University of San Francisco
Erica Divinagracia, University of San Francisco
Adolfo Barrales, University of San Francisco

This tutorial was made possible by an Open Education Resource grant awarded to the first two authors by Gleeson Library, University of San Francisco.

UNIVERSITY OF SAN FRANCISCO

CHANGE THE WORLD FROM HERE