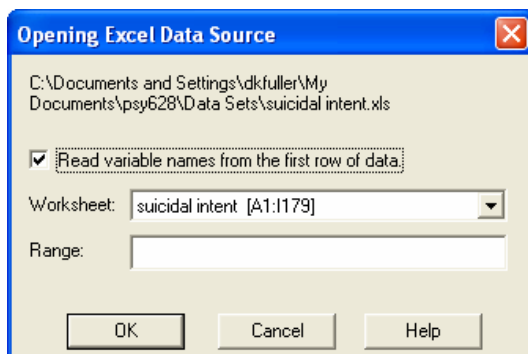
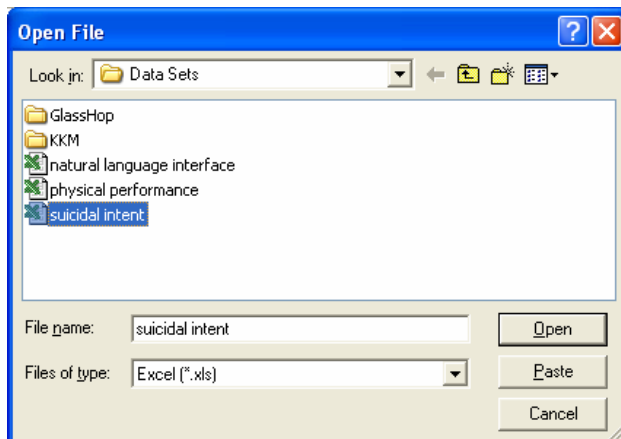
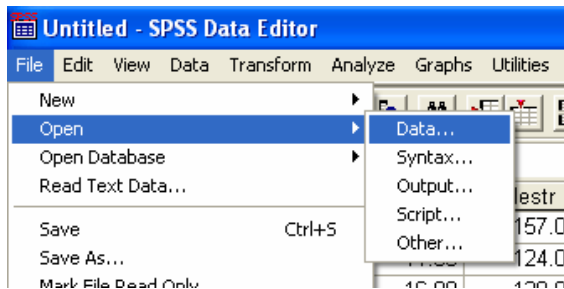


## Multiple Regression using Stepwise Selection

Stepwise selection is used when the researcher has several possible predictors and wants to narrow them down to the most ‘useful’ predictors. It should only be used for prediction; that is, do not pretend the results are *theoretically important*.

Since there are several variables, you need to download an Excel file that contains the data from <http://www.mtsu.edu/~dkfuller/psy628/labs/suicidalintent.xls>.

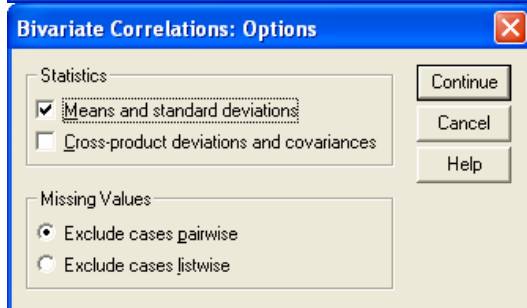
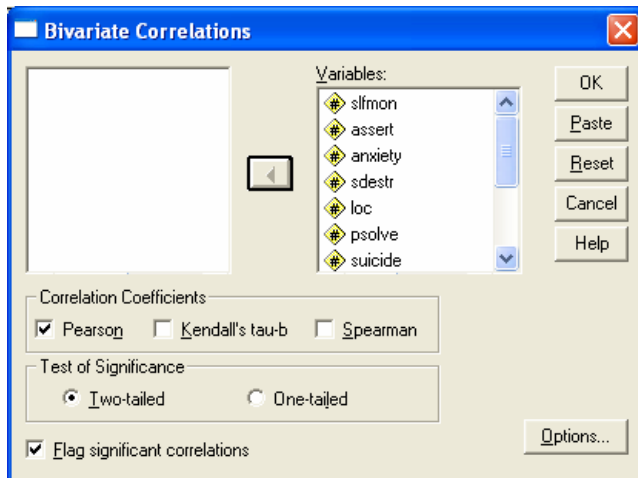
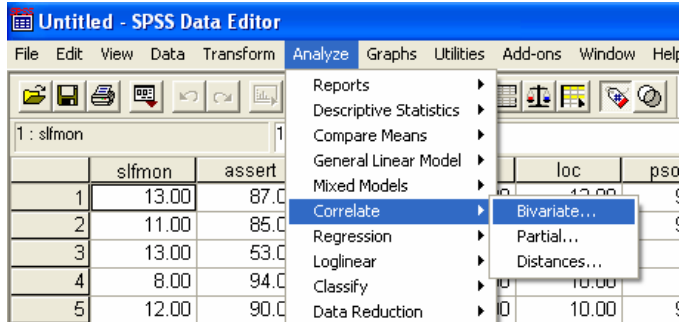


### FYI...

slfmon = Self-monitoring score  
 anxiety = anxiety score  
 loc = locus of control  
 suicide = suicidal intent  
 alcohol = alcohol usage

assert = assertiveness score  
 sdestr = self-destructiveness score  
 psolve = problem solving ability score  
 drugs = drug usage

You should report descriptive statistics and zero-order correlations among all the variables.



## Correlations

Descriptive Statistics

|         | Mean     | Std. Deviation | N   |
|---------|----------|----------------|-----|
| slfmon  | 11.8764  | 2.06843        | 178 |
| assert  | 76.0843  | 21.62753       | 178 |
| anxiety | 10.3567  | 4.96531        | 171 |
| sdestr  | 129.6236 | 24.43945       | 178 |
| loc     | 10.8539  | 3.85339        | 178 |
| psolve  | 78.3114  | 16.53507       | 167 |
| suicide | 50.0562  | 9.83636        | 178 |
| drugs   | 2.4719   | .57421         | 178 |
| alcohol | 2.9888   | .53137         | 178 |

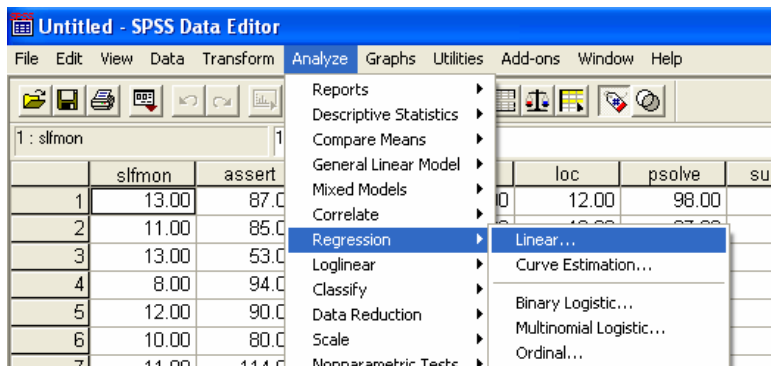
Correlations

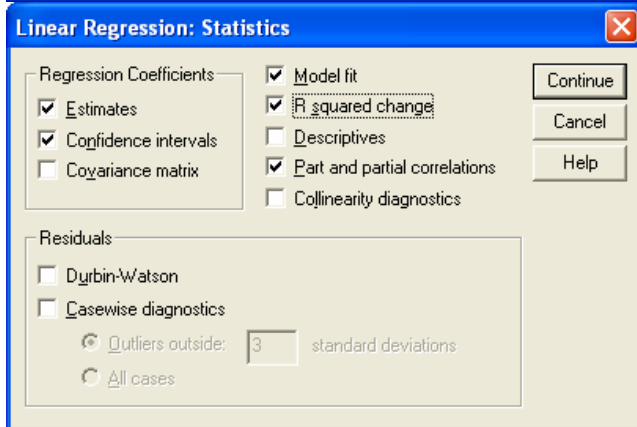
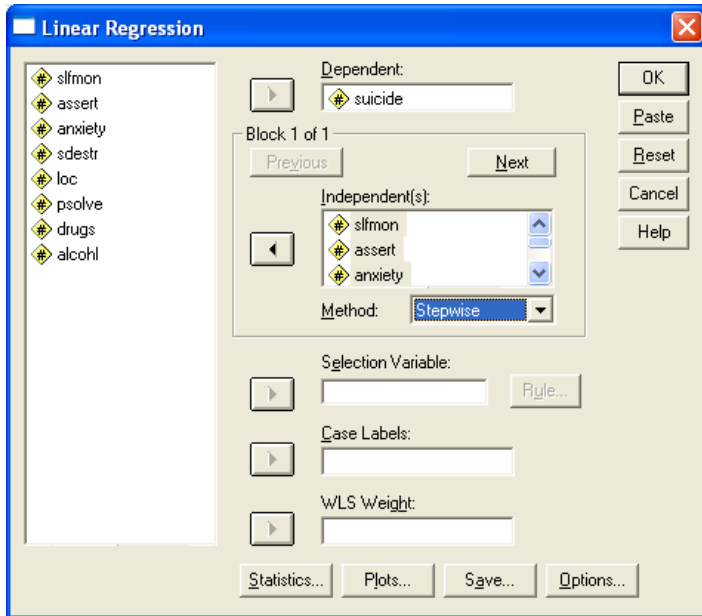
|         |                     | slfmon  | assert  | anxiety | sdestr  | loc     | psolve  | suicide | drugs   | alcohol |
|---------|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| slfmon  | Pearson Correlation | 1       | -.457** | .273**  | -.243** | .006    | -.079   | .151*   | .325**  | .333**  |
|         | Sig. (2-tailed)     | .       | .000    | .000    | .001    | .942    | .313    | .044    | .000    | .000    |
|         | N                   | 178     | 178     | 171     | 178     | 178     | 167     | 178     | 178     | 178     |
| assert  | Pearson Correlation | -.457** | 1       | -.442** | -.006   | -.397** | .180*   | -.300** | -.173*  | -.231** |
|         | Sig. (2-tailed)     | .000    | .       | .000    | .936    | .000    | .020    | .000    | .021    | .002    |
|         | N                   | 178     | 178     | 171     | 178     | 178     | 167     | 178     | 178     | 178     |
| anxiety | Pearson Correlation | .273**  | -.442** | 1       | -.230** | .322**  | -.163*  | .372**  | .246**  | .279**  |
|         | Sig. (2-tailed)     | .000    | .000    | .       | .002    | .000    | .040    | .000    | .001    | .000    |
|         | N                   | 171     | 171     | 171     | 171     | 171     | 160     | 171     | 171     | 171     |
| sdestr  | Pearson Correlation | -.243** | -.006   | -.230** | 1       | -.016   | .485**  | -.307** | -.755** | -.742** |
|         | Sig. (2-tailed)     | .001    | .936    | .002    | .       | .835    | .000    | .000    | .000    | .000    |
|         | N                   | 178     | 178     | 171     | 178     | 178     | 167     | 178     | 178     | 178     |
| loc     | Pearson Correlation | .006    | -.397** | .322**  | -.016   | 1       | -.078   | .329**  | .236**  | .206**  |
|         | Sig. (2-tailed)     | .942    | .000    | .000    | .835    | .       | .315    | .000    | .002    | .006    |
|         | N                   | 178     | 178     | 171     | 178     | 178     | 167     | 178     | 178     | 178     |
| psolve  | Pearson Correlation | -.079   | .180*   | -.163*  | .485**  | -.078   | 1       | -.537** | -.253** | -.354** |
|         | Sig. (2-tailed)     | .313    | .020    | .040    | .000    | .315    | .       | .000    | .001    | .000    |
|         | N                   | 167     | 167     | 160     | 167     | 167     | 167     | 167     | 167     | 167     |
| suicide | Pearson Correlation | .151*   | -.300** | .372**  | -.307** | .329**  | -.537** | 1       | .155*   | .215**  |
|         | Sig. (2-tailed)     | .044    | .000    | .000    | .000    | .000    | .000    | .       | .038    | .004    |
|         | N                   | 178     | 178     | 171     | 178     | 178     | 167     | 178     | 178     | 178     |
| drugs   | Pearson Correlation | .325**  | -.173*  | .246**  | -.755** | .236**  | -.253** | .155*   | 1       | .536**  |
|         | Sig. (2-tailed)     | .000    | .021    | .001    | .000    | .002    | .001    | .038    | .       | .000    |
|         | N                   | 178     | 178     | 171     | 178     | 178     | 167     | 178     | 178     | 178     |
| alcohol | Pearson Correlation | .333**  | -.231** | .279**  | -.742** | .206**  | -.354** | .215**  | .536**  | 1       |
|         | Sig. (2-tailed)     | .000    | .002    | .000    | .000    | .006    | .000    | .004    | .000    | .       |
|         | N                   | 178     | 178     | 171     | 178     | 178     | 167     | 178     | 178     | 178     |

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Now, we want to determine which variables should be used to predict suicidal intent using linear regression with the stepwise selection method.





## Regression

Variables Entered/Removed<sup>a</sup>

| Model | Variables Entered | Variables Removed | Method  |
|-------|-------------------|-------------------|---|
| 1     | psolve            | .                 | Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100). |
| 2     | loc               | .                 | Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100). |
| 3     | anxiety           | .                 | Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100). |
| 4     | drugs             | .                 | Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100). |

a. Dependent Variable: suicide

**Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics |          |     |     |               |
|-------|-------------------|----------|-------------------|----------------------------|-------------------|----------|-----|-----|---------------|
|       |                   |          |                   |                            | R Square Change   | F Change | df1 | df2 | Sig. F Change |
| 1     | .534 <sup>a</sup> | .285     | .280              | 8.14854                    | .285              | 62.918   | 1   | 158 | .000          |
| 2     | .612 <sup>b</sup> | .374     | .366              | 7.64812                    | .089              | 22.352   | 1   | 157 | .000          |
| 3     | .647 <sup>c</sup> | .418     | .407              | 7.39519                    | .044              | 11.923   | 1   | 156 | .001          |
| 4     | .674 <sup>d</sup> | .454     | .440              | 7.19059                    | .035              | 10.004   | 1   | 155 | .002          |

- a. Predictors: (Constant), psolve
- b. Predictors: (Constant), psolve, loc
- c. Predictors: (Constant), psolve, loc, anxiety
- d. Predictors: (Constant), psolve, loc, anxiety, drugs

**ANOVA<sup>e</sup>**

| Model |            | Sum of Squares | df  | Mean Square | F      | Sig.              |
|-------|------------|----------------|-----|-------------|--------|-------------------|
| 1     | Regression | 4177.687       | 1   | 4177.687    | 62.918 | .000 <sup>a</sup> |
|       | Residual   | 10491.007      | 158 | 66.399      |        |                   |
|       | Total      | 14668.694      | 159 |             |        |                   |
| 2     | Regression | 5485.167       | 2   | 2742.583    | 46.887 | .000 <sup>b</sup> |
|       | Residual   | 9183.527       | 157 | 58.494      |        |                   |
|       | Total      | 14668.694      | 159 |             |        |                   |
| 3     | Regression | 6137.229       | 3   | 2045.743    | 37.407 | .000 <sup>c</sup> |
|       | Residual   | 8531.465       | 156 | 54.689      |        |                   |
|       | Total      | 14668.694      | 159 |             |        |                   |
| 4     | Regression | 6654.487       | 4   | 1663.622    | 32.176 | .000 <sup>d</sup> |
|       | Residual   | 8014.207       | 155 | 51.705      |        |                   |
|       | Total      | 14668.694      | 159 |             |        |                   |

- a. Predictors: (Constant), psolve
- b. Predictors: (Constant), psolve, loc
- c. Predictors: (Constant), psolve, loc, anxiety
- d. Predictors: (Constant), psolve, loc, anxiety, drugs
- e. Dependent Variable: suicide

**Coefficients<sup>a</sup>**

| Model |            | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. | 95% Confidence Interval for B |             | Correlations |         |       |
|-------|------------|-----------------------------|------------|---------------------------|--------|------|-------------------------------|-------------|--------------|---------|-------|
|       |            | B                           | Std. Error | Beta                      |        |      | Lower Bound                   | Upper Bound | Zero-order   | Partial | Part  |
| 1     | (Constant) | 75.128                      | 3.115      |                           | 24.121 | .000 | 68.976                        | 81.280      |              |         |       |
|       | psolve     | -.311                       | .039       | -.534                     | -7.932 | .000 | -.389                         | -.234       | -.534        | -.534   | -.534 |
| 2     | (Constant) | 65.926                      | 3.512      |                           | 18.771 | .000 | 58.989                        | 72.863      |              |         |       |
|       | psolve     | -.302                       | .037       | -.518                     | -8.190 | .000 | -.375                         | -.229       | -.534        | -.547   | -.517 |
|       | loc        | .775                        | .164       | .299                      | 4.728  | .000 | .451                          | 1.099       | .326         | .353    | .299  |
| 3     | (Constant) | 61.946                      | 3.586      |                           | 17.273 | .000 | 54.862                        | 69.030      |              |         |       |
|       | psolve     | -.283                       | .036       | -.485                     | -7.838 | .000 | -.354                         | -.211       | -.534        | -.532   | -.479 |
|       | loc        | .592                        | .167       | .228                      | 3.541  | .001 | .262                          | .922        | .326         | .273    | .216  |
|       | anxiety    | .436                        | .126       | .225                      | 3.453  | .001 | .187                          | .685        | .378         | .266    | .211  |
| 4     | (Constant) | 71.074                      | 4.526      |                           | 15.703 | .000 | 62.132                        | 80.015      |              |         |       |
|       | psolve     | -.304                       | .036       | -.522                     | -8.513 | .000 | -.375                         | -.234       | -.534        | -.564   | -.505 |
|       | loc        | .688                        | .165       | .265                      | 4.161  | .000 | .361                          | 1.015       | .326         | .317    | .247  |
|       | anxiety    | .502                        | .125       | .260                      | 4.033  | .000 | .256                          | .748        | .378         | .308    | .239  |
|       | drugs      | -3.610                      | 1.141      | -.201                     | -3.163 | .002 | -5.865                        | -1.356      | .046         | -.246   | -.188 |

- a. Dependent Variable: suicide

Excluded Variables<sup>e</sup>

| Model   | Beta In | t                  | Sig.              | Partial<br>Correlation | Collinearity<br>Statistics |      |
|---------|---------|--------------------|-------------------|------------------------|----------------------------|------|
|         |         |                    |                   |                        | Tolerance                  |      |
| 1       | slfmon  | .055 <sup>a</sup>  | .808              | .420                   | .064                       | .994 |
|         | assert  | -.238 <sup>a</sup> | -3.631            | .000                   | -.278                      | .975 |
|         | anxiety | .299 <sup>a</sup>  | 4.658             | .000                   | .348                       | .974 |
|         | sdestr  | .057 <sup>a</sup>  | .746              | .457                   | .059                       | .785 |
|         | loc     | .299 <sup>a</sup>  | 4.728             | .000                   | .353                       | .997 |
|         | drugs   | -.074 <sup>a</sup> | -1.078            | .283                   | -.086                      | .952 |
|         | alcohol | -.066 <sup>a</sup> | -.925             | .356                   | -.074                      | .888 |
| 2       | slfmon  | .054 <sup>b</sup>  | .847              | .398                   | .068                       | .994 |
|         | assert  | -.129 <sup>b</sup> | -1.827            | .070                   | -.145                      | .782 |
|         | anxiety | .225 <sup>b</sup>  | 3.453             | .001                   | .266                       | .875 |
|         | sdestr  | .039 <sup>b</sup>  | .546              | .586                   | .044                       | .783 |
|         | drugs   | -.158 <sup>b</sup> | -2.405            | .017                   | -.189                      | .896 |
|         | alcohol | -.117 <sup>b</sup> | -1.734            | .085                   | -.138                      | .867 |
|         | 3       | slfmon             | .001 <sup>c</sup> | .008                   | .993                       | .001 |
| assert  |         | -.059 <sup>c</sup> | -.803             | .423                   | -.064                      | .701 |
| sdestr  |         | .095 <sup>c</sup>  | 1.353             | .178                   | .108                       | .746 |
| drugs   |         | -.201 <sup>c</sup> | -3.163            | .002                   | -.246                      | .870 |
| alcohol |         | -.170 <sup>c</sup> | -2.581            | .011                   | -.203                      | .831 |
| 4       | slfmon  | .061 <sup>d</sup>  | .953              | .342                   | .077                       | .855 |
|         | assert  | -.057 <sup>d</sup> | -.800             | .425                   | -.064                      | .701 |
|         | sdestr  | -.138 <sup>d</sup> | -1.371            | .172                   | -.110                      | .345 |
|         | alcohol | -.104 <sup>d</sup> | -1.467            | .144                   | -.117                      | .698 |

- a. Predictors in the Model: (Constant), psolve  
b. Predictors in the Model: (Constant), psolve, loc  
c. Predictors in the Model: (Constant), psolve, loc, anxiety  
d. Predictors in the Model: (Constant), psolve, loc, anxiety, drugs  
e. Dependent Variable: suicide

**Which model should you report? The stepwise selection procedure ends when it has found the 'best' model. Thus, the last model is the one reported.**