**Project 3**

Use the given SPSS data to run the following. If you complete the exercises using R, please use the lm function for multiple regression and the foreign package for importing the SPSS data file.

Please write up the results in APA format (no more than 1 page text for each problem, figures or tables are not included in the 1 page limit).

The file for this task (multreg.sav) contains data from 401 former citizens of Statististan. We have information about their hourly wage (in the local currency: stollars), how many friends they had, and how old they got (‘life expectation’). Professor Smith believes that those who earn more and those who have more friends will live longer. Furthermore, she thinks that wages will moderate the relationship between friends and life expectancy. She asks you to conduct the analysis to examine these hypotheses. Please run the analyses and then write up the results in APA format (no more than 1 page of text). Make sure you write out the final regression equation, interpret all unstandardized coefficients after mean centering, report simple slope analyses, and graph the results using the usual conventions. Also mention any limitations or problems with the analyses.

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| Table 1 *Hierarchical Regression Analysis for Variables Predicting Life Expectation* |
|  | *b* | *SE B* | *β* | *VIF* | *ΔR2* | *ΔF* |
| Step 1 |  |  |  |  | .475 | 180.230\*\*\* |
| Constant | 32.592 | 1.967 |  |  |  |  |
| Wage | 1.051 | .083 | .458\*\*\* | 1.002 |  |  |
| Friends | .338 | .023 | .538\*\*\* | 1.002 |  |  |
| Step 2 |  |  |  |  | .094 | 86.254\*\*\* |
| Constant | 53.406 | 2.865 |  |  |  |  |
| Wage | -.147 | .150 | -.064 | 3.909 |  |  |
| Friends | -.074 | .049 | -.117 | 5.586 |  |  |
| Wage\*Friends | .024 | .003 | .873\*\*\* | 8.136 |  |  |
|  | Note. N = 401; \*\*p<.01, \*\*\*p<.001 |

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| Table 2 *Mean Centered Hierarchical Regression Analysis for Variables Predicting Life Expectation* |
|  | *b* | *SE B* | *β* | *VIF* | *ΔR2* | *ΔF* |
| Step 1 |  |  |  |  | .475 | 180.230\*\*\* |
| Constant | 67.128 | .670 |  |  |  |  |
| Wage\_cen | 1.051 | .083 | .458\*\*\* | 1.002 |  |  |
| Friends\_cen | .338 | .023 | .538\*\*\* | 1.002 |  |  |
| Step 2 |  |  |  |  | .094 | 86.254\*\*\* |
| Constant | 67.404 | .609 |  |  |  |  |
| Wage\_cen | 1.053 | .076 | .459\*\*\* | 1.002 |  |  |
| Friends\_cen | .329 | .021 | .524\*\*\* | 1.004 |  |  |
| Wage\*Friends\_cen | .024 | .003 | .306\*\*\* | 1.002 |  |  |
|  | Note. N = 401; \*\*p<.01, \*\*\*p<.001 |

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|  | Table 3 *Descriptive Analysis for Variables Predicting Life Expectation* |
|  | *M* | *SD* |
| Wage\_cen | .003 | 8.050 |
| Friends\_cen | .003 | 29.418 |

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| *Table 4 Simple Slope Analysis of Friends Predicting Life Expectation with a Moderator of Wage* |
|  | *b* | *SE B* |
| High group |  |  |
| Constant | 75.882\*\*\* | .862 |
| High\_wage | 1.053\*\*\* | .076 |
| Friends\_cen | .523\*\*\* | .029 |
| Hign\_inter | .024\*\*\* | .003 |
| Low group |  |  |
| Constant | 58.925\*\*\* | .862 |
| Low\_wage | 1.053\*\*\* | .076 |
| Friends\_cen | .136\*\*\* | .030 |
| Low\_inter | .024\*\*\* | .003 |
| Note. N = 401; \*\*\*p<.001 |

 In order to test for a moderation effect of wage on the relationship between friends and life expectation, two hierarchical regression was conducted. The first hierarchical regression aims to check the moderation effect before mean centering predictor. In order to do that, we first entered wage and friends as our predictors and life expectation as the outcome; then for step 2 an interaction term of wage\*friends was included. Results in Table 1 indicate that there is a moderation effect of wage because the interaction term significantly predicted life expectation after partialling out the main effects of wage and friends (b=0.024, p<0.01). And the product term explained a significant amount of variance in life expectation (R2=0.094, F(3,397)=86.254, p<0.01). The regression model is Life Expectation = 53.406-0.147(Wage)-0.074(Friends)+0.024(Wage\*Friends). The Model indicates that both wage and number of friends correlate negatively with life expectation, which means that people with higher wage and more friends have shorter life expectation. However, results also suggest that there is a high level of multicollinearity (VIF=8.136), therefore we then mean centered the two predictors and repeated the same steps of the first hierarchical regression.

 After mean centering wage and friends, we entered the mean centered wage and friends in step 1 and mean centered product term in step 2. Results in table 2 also provide support for the moderation (b=0.024, R2=0.569, F(3,397)=86.254, p<0.01) as mean centering does not change variance explained by the product term. However, now the regression model becomes Life Expectation = 67.404+1.053(Wage)+0.329(Friends)+0.024(Wage\*Friends). In this model, the constant 67.404 means the value of life expectation when all predictors are at the mean, and the regression weights of wage and friends indicate the slope of each predictor when other predictors are at their mean. For example, 0.329 is the rate of change in life expectation with one additional friend while holding wage and the product term at their mean. And the weight of the product term means with every additional friend, the rate of change of life expectation on wage is 0.024.

Then in order to the significance of the relationship between friends and life expectation while holding wage at a high and low value, we conducted the simple slope analysis with wage being set as one standard deviation (SD) above and one standard deviation below the mean. Results in table 4 indicate that the relationship between friends and life expectation is significant both when wage is high (b=0.523, p<0.01) and when wage is low (b=0.136, p<0.01).

After generating the simple slope equation of wage, we plotted a graph of the moderation model. Figure 1 demonstrates that wage is having an enhancing effect on the relationship between friends and life expectation, which means that with wage increasing, the effect of friends on life expectation will also increase.

In a moderation analysis, the choice of moderator and predictor should be based on theories, yet in this case it is only based on Professor Smith’s belief. It is possible that wage is the predictor and friends is the moderator, and that can greatly influence the whole model and the results subsequently.