Presenting the Results of a Multiple Regression Analysis

Example 1

[illegible] Average. We had data from 30 graduate students on the following variables: GPA (graduate grade point average), GREQ (score on the quantitative section of the Graduate Record Exam, a commonly used entrance exam for graduate programs), GREV (score on the verbal section of the GRE), MAT (score on the Miller Analogies Test, another graduate entrance exam), and AR, the Average Rating that the student received from 3 professors who interviewed the student prior to making admission decisions. GPA can exceed 4.0, since this university attaches pluses and minuses to letter grades.

Later I shall show you how to use SAS to conduct a multiple regression analysis like this. Right now I simply want to give you an example of how to present the results of such an analysis. You can expect to receive from me a few assignments in which I ask you to conduct a multiple regression analysis and then present the results. I suggest that you use the examples below as your models when preparing such assignments.

Table 1.

Graduate Grade Point Averages Related to Criteria Used When Making Admission Decisions (N = 30).

	Zero-Order *r*					[illegible]	*sr*	*b*
Variable	AR	MAT	GREV	GREQ	GPA			
GREQ					.611*	.32*	.26	.0040
GREV				.468*	.581*	.21	.17	.0015
MAT			.426*	.267	.604*	.32*	.26	.0209
AR		.525*	.405*	.508*	.621*	.20	.15	.1442
							Intercept =	-1.738
Mean	3.57	67.00	575.3	565.3	3.31			
SD	0.84	9.25	83.0	48.6	0.60	R^2 =	.64*	

*$p < .05$

Multiple linear regression analysis was used to develop a model for predicting graduate [illegible] grade point average from their GRE scores (both verbal and quantitative), MAT scores, and [illegible] admission interview with those professors. Basic descriptive statistics and regression coefficients are shown in Table 1. Each of the predictor variables had a significant ($p < .01$) zero-order correlation with graduate GPA, but only the quantitative GRE and the MAT predictors had significant ($p < .05$) partial effects in the full model. The four predictor model was able to account for 64% of the variance in graduate GPA, $F(4, 25) = 11.13$, $p < .001$, $R^2 = .64$, 90% CI [.35, .72].

Based on this analysis, we have recommended that the department reconsider requiring the interview as part of the application procedure. Although the interview ratings were the single best

predictor, those ratings had little to offer in the context of the GRE and MAT scores, and obtaining those ratings is much more expensive than obtaining the standardized test scores. We recognize, however, that the interview may provide the department with valuable information which is not considered in the analysis rep
interests. One must also consider that the students may gain valuable information about us during the interview, information which may help the students better evaluate whether our program is really the right one for them.

In the table above, I have used asterisks to indicate which zero-order correlations and beta weights are significant and to indicate that the multiple *R* is significant. I assume that the informed reader will know that if a beta is significant then the semipartial *r* and the unstandardardized slope are also significant. Providing the unstandardized slopes, and intercept is optional, but recommended in some cases for example, when the predictors include dummy variables or variables for which the unit of measure is intrinsically meaningful (such as pounds or inches), then unstandardized slopes should be reported. One should almost always provide either the beta weights or the semipartials or both.

If there were more than four predictors, a table of this format would get too crowded. The univariate statistics and zero order correlations between predictors could be presented in one table and the statistics involving unique effects in another, like this:

Table 2.

Graduate Grade Point Averages Related to Criteria Used When Making Admission Decisions (N = 30).

	Zero-Order *r*				
Variable	AR	MAT	GREV	GREQ	GPA
GREQ					.611*
GREV				.468*	.581*
MAT			.426*	.267	.604*
AR		.525*	.405*	.508*	.621*
Mean	3.57	67.00	575.3	565.3	3.31
SD	0.84	9.25	83.0	48.6	0.60

*$p < .05$

Table 3.

Multiple Regression Predicting Graduate Grade Point Averages

Predictor	Zero-order *r*	β	*sr*	*p*
GREQ	.611*	.32*	.26	.0040
GREV	.581*	.21	.17	.0015
MAT	.604*	.32*	.26	.0209
AR	.621*	.20	.15	.1442

Note. Exact *p* values are for the unique effects of the predictors.

*p < .05

Notice that I have included the zero-order correlation coefficients. Having both the zero-order correlation coefficients and the beta weights (or the semipartial correlation coefficients) helps the reader judge the extent of the effects of redundancy or of suppressor effects.

When you have reliability estimates for several of the variables, they can be included on the main diagonal of the correlation matrix, like this (from Moyer, F. E., Aziz, S., & Wuensch, K. L. (2017). From workaholism to burnout: Psychological capital as a mediator. *International Journal of Workplace Health Management*, *10*, 213-227. doi: 10.1108/IJWHM-10-2016-0074):

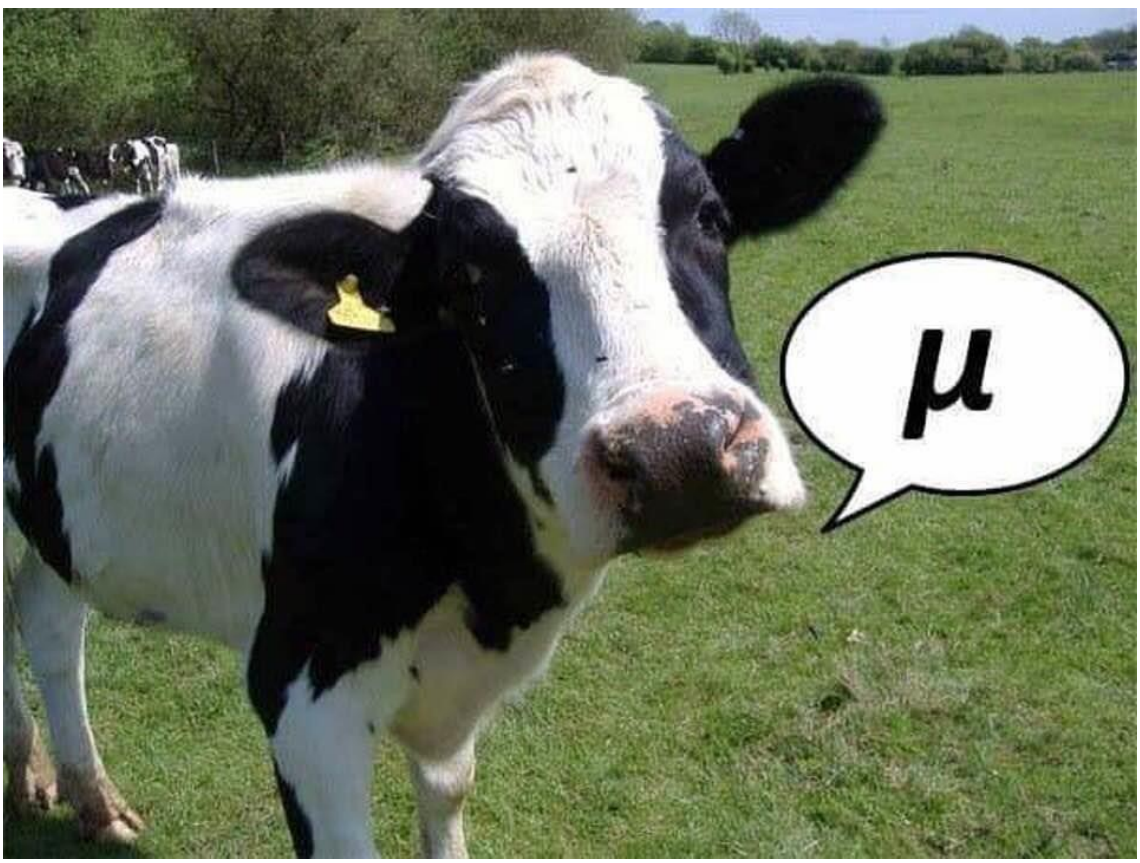

Table 1.

Descriptive Statistics and Intercorrelations

Variable	WAQ	PCQ	EE	PA	DE	Age	Tenure	Income Bracket	Hours Worked
WAQ	(.92)								
PCQ	-.38**	(.93)							
EE	.60**	-.48**	(.92)						
PA	-.24**	.60**	-.29**	(.75)					
DE	.43**	-.44**	.67**	-.35**	(.74)				
Age	-.08	.17*	-.19**	.15*	-.14*	_			
Tenure	-.04	.05	-.04	.06	-.01	.57**	_		
Income Bracket	.09	.24**	-.04	.16**	.03	.29**	.24**	_	
Hours Worked	.43**	.03	.23**	.01	.19**	.17*	.09	.54**	_
Range	29 - 145	24 - 120	0 - 54	0 - 48	0 - 30				
Mean	73.22	93.60	30.48	43.45	10.61	49.30	11.81	4.29	48.82
SD	17.96	12.23	12.50	7.46	5.45	11.71	8.46	1.65	8.65

Note. *N* [illegible] Analysis Questionnaire; PCQ = Psychological Capital Questionnaire; EE = Emotional Exhaustion subscale; PA = Personal Accomplishment subscale; DE = Depersonalization subscale
$^{*}p < .05$, $^{**}p < .001$.

Example 2

Here is another example, this time with a sequential multiple regression analysis. Additional analyses would follow those I presented here, but this should be enough to give you the basic idea. Notice that I made clear which associations were positive and which were negative. This is not necessary when all of the associations are positive (when someone tells us that X and Y are correlated with Z we assume that the correlations are positive unless we are told otherwise).

Results

Complete data[1] were available for 389 participants. Basic descriptive statistics and values of Cronbach alpha are shown in Table 1

Table 3

Basic Descriptive Statistics and Cronbach Alpha

Variable	*M*	*SD*	[illegible]
Subjective Well Being	24.06	5.65	.84
Positive Affect	36.41	5.67	.84
Negative Affect	20.72	5.57	.82
SJAS-Hard Driving/Competitive	3.31	2.36	.66
Rosenberg Self Esteem	40.62	6.14	.86
Contingent Self Esteem	48.99	8.52	.84
Perceived Social Support	84.52	8.39	.91
Social Network Diversity	5.87	1.45	
Number of Persons in Social Network	19.39	7.45	

Three variables were transformed prior to analysis to reduce skewness. These included Rosenberg self esteem (squared), perceived social support (exponentiated), and number of persons in social network (log). Each outcome variable was significantly correlated with each other outcome variable. Subjective well being was positively correlated with PANAS positive (r = .433) and negatively correlated with PANAS negative (r = -.348). PANAS positive was negatively correlated with PANAS negative (r = -.158). Correlations between the predictor variables are presented in Table 2.

Table 4

Correlations Between Predictor Variables

	SJAS-HC	RSE	CSE	PSS	ND
RSE	.231*				
CSE	.025	-.446*			
PSS	.195*	.465*	-.088		
ND	.110*	.211*	-.057	.250*	
NP	.100*	.215*	.076	.283	.660*

*p [illegible] .05

[1] Data available in Hoops.sav file on my SPSS Data Page. Intellectual property rights belong to Anne S. Hoops.

A sequential multiple regression analysis was employed to predict subjective well being. On the first step SJAS-HC was entered into the model. It was significantly correlated with subjective well being, as shown in Table 3. On the second step all of the remaining predictors were entered simultaneously, resulting in a significant increase in R^2, $F(5, 382) = 48.79$, $p < .001$. The full model R^2 was significantly greater than zero, $F(6, 382) = 42.49$, $p < .001$, $R^2 = .40$, 90% CI [.33, .45]. As shown in Table 3, every predictor had a significant zero-order correlation with subjective self esteem. SJAS-HC did not have a significant partial effect in the full model, but Rosenberg self esteem, contingent self esteem, perceived social support, and number of persons in social network did have significant partial effects. Contingent self esteem functioned as a suppressor variable. When the other predictors were ignored, contingent self esteem was negatively correlated with subjective well being, but when the effects of the other predictors were controlled it was positively correlated with subjective well being.

Pedagogical Note. In every table here, I have arranged to have the column of zero-order correlation coefficients adjacent to the column of Beta weights. This makes it easier to detect the presence of suppressor effects.

Table 5

Predicting Subjective Well Being

Predictor	β	*r*	95% CI for ρ
SJAS-Hard Driving Competitive	-.035	.131*	.03, .23
Rosenberg Self Esteem	.561*	.596*	.53, .66
Contingent Self Esteem	.092*	-.161*	-.26, -.06
Perceived Social Support	.172*	.426*	.34, .50
Network Diversity	-.089	.134*	.04, .23
Number of Persons in Network	.107*	.221*	.12, .31

*$p \le .05$

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- [illegible]