

Chapter 2 Exercise Answer Key

1. The dataset Exercise2.1.xls includes subscale scores taken from a sample of 480 college students who completed a scale measuring five personality traits. Using SPSS, Excel, or R, take the data and obtain estimates of the sample mean, variance, and standard deviation of each scale.

Answer

Descriptive Statistics				
	N	Mean	Std. Deviation	Variance
extraversion	411	25.57	6.609	43.679
agreeableness	412	32.92	5.811	33.766
conscientious	411	33.95	5.626	31.654
neuroticism	411	24.69	6.381	40.712
openness	408	38.61	6.217	38.651
Valid N (listwise)	398			

2. With the Exercise2.1.xls data, obtain correlations among the five personality scale scores.

Which scales have scores that are most closely associated with one another? What do these relationships tell us about personality?

Answer

		Correlations				
		extraversion	agreeableness	conscientious	neuroticism	openness
extraversion	Pearson Correlation	1	.206**	.089	-.127*	.185**
	Sig. (2-tailed)		.000	.071	.010	.000
	N	411	409	408	408	405
agreeableness	Pearson Correlation	.206**	1	.174**	-.320**	.033
	Sig. (2-tailed)	.000		.000	.000	.503
	N	409	412	409	409	407
conscientious	Pearson Correlation	.089	.174**	1	-.122*	.053
	Sig. (2-tailed)	.071	.000		.014	.287
	N	408	409	411	408	405
neuroticism	Pearson Correlation	-.127*	-.320**	-.122*	1	-.111*
	Sig. (2-tailed)	.010	.000	.014		.026

	N	408	409	408	411	405
openness	Pearson Correlation	.185**	.033	.053	-.111*	1
	Sig. (2-tailed)	.000	.503	.287	.026	
	N	405	407	405	405	408

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

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

The strongest relationship is between Neuroticism and agreeableness ($r=-0.32$), indicating that individuals who exhibit greater neuroticism, also exhibit less agreeableness. The second largest relationship was between conscientiousness and openness ($r=0.287$). Thus, we can conclude that individuals who are more conscientious are also more open.

3. Using the Exercise 2.1.xls data, fit a regression model in which the mastery goal orientation score that you will find in the dataset is the dependent variable, and the five personality scores are the independent variables. What are the regression model parameter estimates? Are the personality inventory scores statistically significant predictors of mastery goal orientation?

Write up a brief summary of your results.

Answer

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.357 ^a	.128	.117	2.53291

a. Predictors: (Constant), openness, agreeableness, conscientious, extraversion, neuroticism

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

1	(Constant)	7.872	1.534		5.131	.000
	extraversion	.055	.020	.134	2.707	.007
	agreeableness	.009	.024	.019	.360	.719
	conscientious	.124	.023	.257	5.311	.000
	neuroticism	.044	.021	.106	2.092	.037
	openness	.071	.021	.164	3.379	.001

a. Dependent Variable: mastery

The unstandardized regression coefficients are:

Extraversion 0.055

Agreeableness 0.009

Conscientiousness 0.124

Neuroticism 0.044

Openness 0.071

Of the predictors, all are statistically significantly related to mastery goal orientation except for agreeableness. In addition, each of the statistically significant variables has a positive relationship with mastery, meaning that larger values of the personality inventory scores are associated with a larger mastery goal orientation score.

4. You are asked to compare the relative performance of a student's math test versus that of their standardized reading achievement exam. Her math score is 17.6, and her standardized reading achievement score is 148. The math and reading scores for the sample appear in the table below. Please determine for which performance measure the student has the higher relative score, using methods described in this chapter.

Math test	Reading test
19	142

18	168
19	155
14	157
22	136
16	144
17	171
21	153
23	150
18	151

Answer

Descriptive Statistics

	N	Mean	Std. Deviation
math	10	18.7000	2.75076
reading	10	152.7000	10.91431
Valid N (listwise)	10		

$$Z_{math} = \frac{17.6 - 18.7}{2.8} = \frac{-1.1}{2.8} = -0.39$$

$$Z_{reading} = \frac{148 - 152.7}{10.9} = \frac{-4.7}{10.9} = -0.43$$

Based on the standard scores, the student scored slightly lower in reading than in math.

5. A colleague needs to design a study for assessing the relationship between scores on an intrinsic motivation scale (higher values indicate a higher sense of intrinsic motivation), and scores on a short term memory task (higher values indicate better use of short term memory).

The scales are each designed for use with people between the ages of 16 and 80. Write a brief description of the study design that you would recommend to your colleague. In your design, please include a description of how you would obtain a sample, from what population the sample would be drawn, and what statistical analysis you would recommend your colleague use. Also, please indicate the null hypothesis associated with the statistical analysis that you elect to recommend.

Answer

A number of study design strategies could be employed to address this problem. With respect to the data analysis, either regression or correlation could be used to assess the strength and nature of the relationship between the two variables.

6. Using the rules described in this chapter for calculating the variances and covariances of composites, please calculate the variances for each composite scale below, as well as the covariance for the two.

$$\sigma_{test\ 1\ A}^2 = 33.2$$

$$\sigma_{test\ 1\ B}^2 = 42.8$$

$$\sigma_{test\ 2\ A}^2 = 15.9$$

$$\sigma_{test\ 2\ B}^2 = 19.3$$

$$COV(test\ 1\ A, test\ 1\ B) = 24.8$$

$$COV(test\ 2\ A, test\ 2\ B) = 11.4$$

$$COV(test\ 1\ A, test\ 2\ A) = 14.7$$

$$COV(test\ 1\ A, test\ 2\ B) = 2.2$$

$$COV(test\ 1\ B, test\ 2\ A) = 13.5$$

$$COV(test\ 1\ B, test\ 2\ B)=9.8$$

Answer

$$\sigma_{test\ 1}^2 = \sigma_{test\ 1\ A}^2 + \sigma_{test\ 1\ B}^2 + 2[COV(test\ 1\ A, test\ 1\ B)] = 33.2 + 42.8 + 2[24.8] = 125.6$$

$$\sigma_{test\ 2}^2 = \sigma_{test\ 2\ A}^2 + \sigma_{test\ 2\ B}^2 + 2[COV(test\ 2\ A, test\ 2\ B)] = 15.9 + 19.3 + 2[11.4] = 58$$

$$COV(test\ 1, test\ 2) = COV(test\ 1\ A, test\ 2\ A) + COV(test\ 1\ A, test\ 2\ B) + COV(test\ 1\ B, test\ 2\ A) + COV(test\ 1\ B, test\ 2\ B)$$