Assignment 2: Correlation

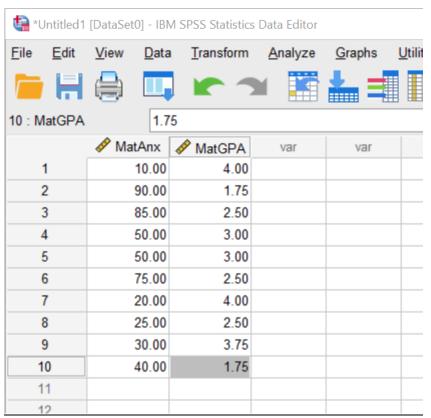
Use the following data to determine if there is a relationship between math anxiety and math GPA. Higher math anxiety scores indicate higher math anxiety.

Participant	Math Anxiety	Math GPA	
1	10	4.00	
2	90	1.75	
3	85	2.50	
4	50	3.00	
5	50	3.00	
6	75	2.50	
7	20	4.00	
8	25	2.50	
9	30	3.75	
10	40	1.75	

SPSS Instructions

- On the bottom left, click Variable View.
- Enter 'MatAnx' in the first cell.
- Enter 'MatGPA' in the cell below the first cell.
- On the bottom left, click Data View.
- Enter the Math Anxiety scores in the first column.
- Enter the Math GPA scores in the second column.
- Click Analyze, Correlate, Bivariate.
- Move the MatAnx and MatGPA icons over to the Variables box.
- Click OK.
- Save the Data file and Output file separately. Use informative file names.

SPSS Data



SPSS Output

Correlations

		MatAnx	MatGPA
MatAnx	Pearson Correlation	1	682 [*]
	Sig. (2-tailed)		.030
	N	10	10
MatGPA	Pearson Correlation	682 [*]	1
	Sig. (2-tailed)	.030	
	N	10	10

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

Written Answers

Show all work.

- (1) Provide the notation for the null and research hypotheses, and a written statement for the former.
- (2) Calculate r.
- (3) Is r statistically significant for α .05, and how do you know?

- (4) Provide the result in APA format and write a conclusion statement.
- (5) If you use α .05 and the null hypothesis is true, what is the probability of rejecting the null hypothesis, and what is it called?
- (6) If you use α .05 and the null hypothesis is true, what is the probability of not rejecting the null hypothesis?
- (7) What is the probability of rejecting a false null hypothesis, and what is it called?
- (8) What is the probability of not rejecting a false null hypothesis, and what is it called?
- (9) The SPSS Output gives you a value for "Sig. (2-tailed)" which is known as a p-value. What is the number and what does it represent?

1.)
$$H_0: \rho=0$$
 $H_1: \rho\neq 0$

 $(\Sigma Y)^2 = 28.75^2 = 826.563$

Null hypothesis: There is no statistically significant linear relationship between math anxiety and math GPA.

2.)

$$r = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{(N \sum x^2 - [\sum x]^2)(N \sum y^2 - [\sum y]^2)}}$$

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10 \times 4 = 40
90 \times 1.75 = 157.5
85 \times 2.5 = 212.5
50 \times 3 = 150
50 \times 3 = 150
75 \times 2.5 = 187.5
20 \times 4 = 80
25 \times 2.5 = 62.5
30 \times 3.75 = 112.5
40 \times 1.75 = 70
N\Sigma XY = 10 \times (40 + 157.5 + 212.5 + 150 + 150 + 187.5 + 80 + 62.5 + 112.5 + 70) = 12,225
(\Sigma X) = 10 + 90 + 85 + 50 + 50 + 75 + 20 + 25 + 30 + 40 = 475
(\Sigma Y) = 4 + 1.75 + 2.5 + 3 + 3 + 2.5 + 4 + 2.5 + 3.75 + 1.75 = 28.75
(\Sigma X)(\Sigma Y) = 475 \times 28.75 = 13656.25
N\sum X^2 = 10 \times (10^2 + 90^2 + 85^2 + 50^2 + 50^2 + 75^2 + 20^2 + 25^2 + 30^2 + 40^2) = 295,750
(\Sigma X)^2 = 475^2 = 225,625
N\sum Y^2 = 10 \times (4^2 + 1.75^2 + 2.5^2 + 3^2 + 3^2 + 2.5^2 + 4^2 + 2.5^2 + 3.75^2 + 1.75^2) = 889.38
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$$r = \frac{12,225-13,656.25}{\sqrt{(295,750-225,625)(889.38-826.563)}} \quad r = \frac{-1431.25}{\sqrt{(70,125)(62.817)}}$$

$$r = -.68$$

3.) Yes. For N – 2 df, which is 10 – 2 = 8 df, the critical values for $\alpha.05$ = +-.632. The test statistic of .68 is less than -.632 so it's statistically significant and we reject H₀.

4.) Result in APA format:
$$r(8) = -.68$$
, p=.03

Conclusion: There is a statistically ignificant regative linear relationship between math anxiety and math GPA, such that the higher the math anxiety the lower the math GPA.

It represents alpha.