`MOT2312 2021/2022

Research Methods (Retake; part Laurens Rook)

Date: --

Time: --

Place: --

Instruction

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Question 1 (total score 8 points)

Researchers investigated the impact of two personality traits (Assertiveness and Politeness) on the perceived likeability a person (liking). One (alternative) hypothesis was tested:

Hypothesis 1: People high (vs. low) in Assertiveness are <u>less likely to be liked</u>.

a) On the next page, you find the JASP output of a regression analysis for this study. Do we accept or reject (alternative) *Hypothesis 1*? [open question; **1 point**]. Use the JASP regression output to motivate your answer [open question; **2 points**].

> - We **reject** H_{alt} that people high (vs. low) in Assertiveness are less likely to be liked --> [**1.0 point** for correct answer].
> - We have: $p < .001$. The associated **p-value is less than .05** (H_{alt} thus is significant) --> [**1.0 point** for correct answer].
> - However, we also have: $t = + 5.059$. The **t-value is positive instead of negative** as hypothesized --> [**1.0 point** for correct answer].

b) What is your interpretation of the intercept-only (H_0) model in the regression output? Use the JASP regression output to motivate your answer [open question; **2 points**].

> The intercept value = 16.027. This indicates that, when the IVs in the model are unaccounted for, the model predicts this amount (16.027) of the DV (Liking). This is a considerable amount.

c) What does the VIF represent, theoretically? [open question; **1 point**]. What is your interpretation of the VIF for Assertiveness? Use the JASP regression output to motivate your answer [open question; **2 points**].

> - The Variance Inflation Factor (VIF) can help in identifying multicollinearity (too strong a relation between predictors). [1 point]
> - VIF > 10 is a problem (it should be lower than this)
> - Here, VIF = 1.043, which is not even close to this threshold. We have no multicollinearity issue in the data. [2 points for the 2 bullet points]

JASP Regression Output for Question 1

Linear Regression

Model Summary – Liking

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	2.427
H_1	0.231	0.053	0.050	2.366

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	163.3	2	81.626	14.58	< .001
	Residual	2888.4	516	5.598		
	Total	3051.6	518			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H_0	(Intercept)	16.027	0.107		150.430	< .001		
H_1	(Intercept)	10.195	1.136		8.971	< .001		
	Assertiveness	0.168	0.033	0.221	5.059	< .001	0.959	1.043
	Politeness	0.021	0.026	0.036	0.821	0.412	0.959	1.043

Question 2 (total score 6 points)

A correlation analysis of all eight dimensions of the Servant Leadership Scale (SLS) yields the following JASP output.

Correlation Matrix

Pearson Correlations

		Empowerment	Standingback	Accountability	Stewardship	Courage	Authenticity	Forgiveness (reversed)	Humility
Empowerment	Pearson's r	—							
	p–value	—							
Standingback	Pearson's r	0.621***	—						
	p–value	< .001	—						
Accountability	Pearson's r	0.466***	0.226	—					
	p–value	< .001	0.098	—					
Stewardship	Pearson's r	0.569***	0.236	0.217	—				
	p–value	< .001	0.082	0.111	—				
Courage	Pearson's r	0.554***	0.290*	0.370**	0.597***	—			
	p–value	< .001	0.032	0.005	< .001	—			
Authenticity	Pearson's r	0.492***	0.321*	0.134	0.523***	0.549***	—		
	p–value	< .001	0.017	0.328	< .001	< .001	—		
Forgiveness (reversed)	Pearson's r	0.220	0.345**	−0.219	−0.062	−0.196	0.122	—	
	p–value	0.113	0.010	0.108	0.652	0.151	0.373	—	
Humility	Pearson's r	0.702***	0.510***	0.127	0.472***	0.371**	0.799***	0.350*	—
	p–value	< .001	< .001	0.363	< .001	0.006	< .001	0.010	—

* p < .05, ** p < .01, *** p < .001

a) Please describe the theoretical link between prediction and correlation? [open question; **2 points**].

> Correlation coefficients allow for making predictions from one variable to another one. Such predictions indicate that when one variable is present at a certain level, the other variable probably also is (or: tends to be) present at a certain level. They "move together" / they are "co-related".

b) Please describe the theoretical link between causality and correlation? [open question; **2 points**].

> Correlation does not equal causality. No inference can be made from a correlation coefficient that changes in one variable led to changes in another one.

c) Please, critically assess the bivariate association between the two variables Humility and Authenticity in the provided JASP output? [open question; **2 points**].

As indicated, $r = +0.799$, $p < .001$. This is a significant, positive, strong association. The variables Humility and Authenticity strongly move together.

Question 3 (total of 8 points)

A descriptive analysis of all eight dimensions of the Servant Leadership Scale (SLS) yields the following JASP output.

Descriptive Statistics ▾

Descriptive Statistics

	Empowerment	Standingback	Accountability	Stewardship	Courage	Authenticity	Forgiveness (reversed)	Humility
Valid	53	55	55	55	55	55	55	53
Missing	6	4	4	4	4	4	4	6
Mean	5.968	5.564	6.776	5.576	5.473	5.441	5.424	5.909
Median	6.143	5.667	7.000	6.000	5.500	5.750	5.667	6.000
Mode ª	6.857	6.000	7.000	6.667	5.000	5.250	7.000	6.000
Std. Deviation	1.210	1.156	0.9751	1.290	1.804	1.299	1.616	1.004
Skewness	−1.007	−0.3015	−1.639	−0.3600	−0.7915	−0.7034	−0.5595	−0.9815
Std. Error of Skewness	0.3274	0.3217	0.3217	0.3217	0.3217	0.3217	0.3217	0.3274
Kurtosis	1.198	0.5397	4.463	−0.9165	0.07360	0.04222	−0.5051	1.004
Std. Error of Kurtosis	0.6444	0.6335	0.6335	0.6335	0.6335	0.6335	0.6335	0.6444
Minimum	2.000	2.000	3.000	2.667	1.500	2.000	1.667	3.000
Maximum	8.000	8.000	8.000	7.667	8.000	7.500	8.000	7.400
Sum	316.3	306.0	372.7	306.7	301.0	299.3	298.3	313.2

ª More than one mode exists, only the first is reported

a) Which measures of central tendency are summarized in this JASP output for the SLS? [open question; **2 points**]?

- Mean
- Median
- Mode

b) Which of the measures of central tendency in the JASP output for the SLS is not appropriate for nominal or ordinal data? [open question; **2 points**]?

- Mean
- For instance, with qualitative groups such as men or women it does not make sense to calculate the mean for men, or mean for women. The nature of such data does not lend itself for a summarization in terms of arithmetic mean values.

c) Which measure of central tendency can be used for nominal data, but is unreliable as a measure of central tendency? Motivate your answer [open question; **2 points**]?

- Mode
- It is unreliable, because a distribution can always be bimodal or trimodal. In such cases, the mode is not an accurate summarization.

d) Theoretically, what is the difference between a bar graph and a histogram? Refer to the applicable scales of measurement in your answer [open question; **2.0 points**]?

- Bar graph = figure with bars representing the frequency of occurrence of items in a qualitative (nominal) variable
- Histogram = figure with bars representing the frequency of occurrence of items in a quantitative (ordinal, interval/ratio) variable
- Difference: qual vs. quant.

Question 4 (total of 8 points)

Below you find a brief description of a journal article by:

Plowright, A., Taylor, C., Davies, D., Sartori, J., Hundt, G. L., & Lilford, R. J. (2018). Formative evaluation of a training intervention for community health workers in South Africa. *PLoS ONE, 13*, e0202817.

Brief description:

"Community Health Workers (CHWs) have a crucial role in improving health in their communities and their role is being expanded in many parts of the world. However, the effectiveness of CHWs is limited by poor training and the education of CHWs has received little scientific attention. Our study was carried out in two districts in South Africa. We developed and piloted an inexpensive (two day) training intervention. Sixty-four CHWs consented to participate in the main study which measured knowledge gains using a _____ of different testing schedules to distinguish between the effects of the intervention, testing, and any interaction between intervention and testing."

e) The authors conducted an experiment. But, what type of research design did the authors probably use for their study? Motivate your answer [open question; **2.0 points**]?

> The authors used a Solomon four-group design. They compared (a) the effects of their intervention schedule, (b) the testing schedule, (c) and (d) the interactions between the two schedules. NOTE that mentioning Solomon four group design will yield full score!

f) Based on the description above, what is your assessment of the internal and external validity of this study? Motivate your answer [open question; **2.0 points**]?

> The Solomon four-group design has a double control design. This means that the internal validity was high. In this case, real CHWs participated in the study, rendering external validity high. (1 point for each observation)

g) Based on the description above, what was the dependent variable under study? Motivate your answer [open question; **1.0 point**]?

> Knowledge gains.

h) Bougie and Sekaran, in their research methods book, describe seven (7) threats to internal validity in experiments. Please mention and briefly describe at least six (6) of those threats [open question; **3.0 points**]?

The usual suspects. Mentioning them = ½ point, adding a brief correct description in keywords = ½ point.