Name: Student number:

MOT2312 2021/2022

Research Methods (Exam; 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). Two (alternative) hypotheses were tested:

Hypothesis 1: People high (vs. low) in Assertiveness are more likely to be liked.

Hypothesis 2: People high (vs. low) in Politeness are more likely to be liked.

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

b) Do we accept or reject (alternative) *Hypothesis 2*? [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 Politeness are more likely to be liked --> [**1.0 point** for correct answer].
- We have: t = + 0.821. The **t-value is positive** as hypothesized --> [**1.0 point** for correct answer].
- However. We also have p < 0.412. The associated **p-value is bigger than .05** (H_{alt} thus is not significant) --> [**1.0 point** for correct answer].

c) What is a Type I error? How is the Type I error related to hypothesis testing research, in general? [open question; **2 points**].

- Type I error = When you reject the null hypothesis H_0 when it is actually true (so you say the H_0 is false, while you shouldn't have) --> [**1.0 point** for correct answer].
- The Type I error is one well-known decision error a researcher can make in the testing of hypotheses (the other one being the Type II error). It is caused by the confidence intervals (set at 95% or 99%) that always leave a margin of error (5%, 1%) --> [**1.0 point** for correct answer around these lines].

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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

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Question 2 (total of 6 points)

A correlation analysis of five dimensions of personality (Stretching, Embracing, AltSrch, DecDiff, HghStd), and two types of recommended movie items (known, unknown) yields the following JASP output.

Correlation

Pearson's Correlations

Variable		Stretching	Embracing	AltSrch	DecDiff	HghStd	known	unknown
1. Stretching	Pearson's r	—						
	p-value	—						
2. Embracing	Pearson's r	0.6335***	—					
	p-value	< .001	—					
3. AltSrch	Pearson's r	0.3027***	0.2836***	—				
	p-value	< .001	< .001	—				
4. DecDiff	Pearson's r	0.1440*	0.03362	0.2857***	—			
	p-value	0.011	0.554	< .001	—			
5. HghStd	Pearson's r	0.4636***	0.2621***	0.2974***	0.2780***	—		
	p-value	< .001	< .001	< .001	< .001	—		
6. known	Pearson's r	0.1116*	0.08504	−0.01838	−0.1123*	−0.06426	—	
	p-value	0.049	0.133	0.746	0.047	0.257	—	
7. unknown	Pearson's r	−0.07935	−0.04684	−0.02852	0.1280*	0.01315	−0.6834***	—
	p-value	0.161	0.409	0.615	0.023	0.817	< .001	—

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

a) How many strong bivariate correlations are summarized in the table, and why? Identify the pairs [open question; **2.0 points**].

Correct answers are:

- Correlations between |.70, 1.00| are strong --> **1.0 point** for providing this observation.
- In this output, there are **no** strong bivariate correlations --> **1.0 point** for providing this conclusion

b) What is your detailed assessment of the bivariate relationship between the variables "Embracing" and "known" in the JASP output? What is your conclusion on the relationship? Motivate your answer [open question; **2.0 points**].

- "Embracing"-"known": r = 0.08504, p = 0.133. This relation is positive, but weak (almost zero), and non-significant (p-value) --> **1.5 point** for providing all 3 observations (each of those is worth **0.5 points**).
- Conclusion: the variables "Embracing" and "known" do not correlate / move together --> **0.5 point** for providing this conclusion.

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c) Kendall's tau-b is an alternative correlation coefficient. Please describe this alternative correlation coefficient, and explain under what conditions a researcher should use it? [open question; **2 points**].

- Kendall's tau-b is used for ordinal variables / ranks (or as a longer answer: when one or more of the variables is measured on an ordinal / ranking scale) --> **1.0 point** for providing this observation.
- It is used for small data sets with a large number of tied ranks (many scores have the same rank) --> **1.0 point** for providing this observation.

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Question 3 (total of 8 points)

A descriptive analysis of three personality dimensions (SWLS, BSCS, Grit) yields the following JASP output.

Descriptive Statistics

Descriptive Statistics

	SWLS	BSCS	Grit
Valid	448	448	448
Missing	0	0	0
Mean	23.26	41.31	3.337
Median	24.00	42.00	3.375
Mode	29.00	44.00	3.375
Skewness	–0.5257	–0.1662	–0.2135
Std. Error of Skewness	0.1153	0.1153	0.1153
Kurtosis	–0.2216	–0.2433	0.1275
Std. Error of Kurtosis	0.2302	0.2302	0.2302
Shapiro-Wilk	0.9704	0.9946	0.9916
P-value of Shapiro-Wilk	< .001	0.116	0.012

a) What is your formal interpretation of the Shapiro-Wilk test for the BSCS and the Grit variables summarized in the JASP output? [open question; **2.0 points**].

Correct answers are:

The formal interpretation of the S-W test is: If not significant (p > .05), the distribution is probably normal; if significant (p < .05) the distribution is probably non-normal.

- For Grit: S-W test = 0.9916, p < .012 (= signif. --> **Grit is probably non-normal)**
  --> **1.0 point** (for correctly labelling the variable "non-normal". This label (non-normal) should explicitly be mentioned.
- For BSCS: S-W test = 0.9946, p < .116 (= nonsignif. --> **BSCS is probably normal)**
  --> **1.0 point** (for correctly labelling the variable "normal". This label ("normal" should explicitly be mentioned**)**

Incorrect answers are:

- Incorrect link made between normality – significance value (for SW, it is non-normality -significance value) --> **0.0 point**
- Coining (non-)normality for BSCS and Grit without specifying why this is the case --> **0.0 point**

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b) Theoretically, what are the documented weaknesses of the Shapiro-Wilk test? What does this lead you to conclude on the results of this test for the BSCS and the Grit variables summarized in the JASP output? [open question; **2.0 points**].

Correct answers are:

- Formal tests for normality (such as S-W test) are always problematic: The test works well for large groups, but not for small groups (it lacks power) **[1.0 point for this]**
- We can, therefore, never be sure that the test results (as above) is true **[1.0 point for this]**

c) If you look at the values of the mean, mode, and median in the JASP output only, what can you say about the nature of skew of the SWLS variable in this study? Please clarify your answer by adding a drawing on how the distribution of the SWLS variable probably looks like [open question; **2.0 points**].

In a distribution, from left to right, you get: Mean (the average value) = 23.26, median (the middle value) = 24.00, mode (the most frequent value) = 29.00. --> **[1.0 point for this** written arrangement, or the same principle in a drawing format (which probably will be the common answer]

This pattern represents a **negatively skewed distribution** --> **[1.0 point for this]**

d) Theoretically, what does the notion of kurtosis refer to? Mention two (2) types of kurtosis, which may occur in a dataset, in general [open question; **2.0 points**].

- Kurtosis = How flat or peaked a normal distribution is **[1.0 point for this]**
- There are 3 possible answers, and 2 of these yield **[1.0 point]**:
    1. **Mesokurtic** = normal curve of moderate breadth with a peak of medium height
    2. **Leptokurtic** = normal curve that is tall and thin (not many scores in the middle, but they have high frequency)
    3. **Platykurtic** = normal curve that is short and broad.

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Question 4 (total of 8 points)

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

Palloni, A., McEniry, M., Huangfu, Y., & Beltran-Sanchez, H. (2020). Impacts of the 1918s flu on survivors' nutritional status. *PLoS ONE*, *15*, e0232805.

Brief description:

"In this paper we assess the 1918-flu long-term effects on nutritional status during infancy and early childhood. A unique set of events that took place in Puerto Rico during 1918-1919 generated conditions of a "_____ experiment". We exploit these conditions to empirically identify effects of exposure to the 1918 flue pandemic and those of the devastation left by an earthquake-tsunami that struck the island in 1918. Because the earthquake-tsunami affected mostly the Western coast of the island, whereas early exposure to the flu was restricted to those born in the interval 1917-1920, we use geographic variation as a proxy of earthquake severity as well as of exposure. We use timing of birth variation to identify flu severity as well as of exposure. We benefit from availability of information on markers of nutritional status in a nationally representative sample of individuals aged 75 and older in 2002."

a) What type of experiment did the authors probably conduct? Motivate your answer [open question; **2.0 points**]?

- **Quasi-experiment** --> **[1.0 point]** (natural experiment would also be correct)
- The authors **compared naturally occurring groups** (that arose due to a unique set of events in Puerto Rico in 1918-1919) with each other on variables of interest (= the definition of the quasi-experiment) --> **1.0 point**.

b) Which factor probably was the dependent variable under study, and why? [open question; **1.0 point**]?

- DV = survivors' nutritional status (during infancy and early childhood) --> **0.5 point** for mentioning this (aspect in brackets needs not be mentioned).
- The authors assessed the 1918-flu long-term effects ON this variable (as stated in the first sentence of the text) --> **0.5 point** for mentioning this.

c) Which factor(s) probably was/were the independent variable(s) under study? [open question; **3.0 points**]?

- Early exposure to flu (yes, no) --> **[1.0 point]**
- Earthquake severity (yes, no) proxied by geographic variation --> **[1.0 point]**
- Flu severity (yes, no) proxied by timing of birth variation --> **[1.0 point]**

NOTE that the no, yes aspect needs not be added.

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d) How would you assess the internal validity of this experiment, from a methodological point of view? Motivate your answer [open question; **2.0 points**]?

- Internal validity is NOT very high --> **[1.0 point]**
- as for a laboratory experiment (randomized + experimental + control group designs). This is, because the researchers did not have control over their experimental groups (they are split based on natural events beyond the researchers' control) --> **[1.0 point]**.