S 7 Mon.řtax correlation, contingentsCtable.

EXAMPLE

A) CalcCet and interpretation of the coefficient pořseries correlations.

Determine the dependence between the quality of the modified IOWA Brace test (motor talent test) and the roundabout in the group of men Tv - Sv. The order in the execution of the rondata was compiled by the teacher SG.

Students	Brace-test	Rondát	d_{and}	d_{and2}
AND	6	2	4	16
B	5	10	- 5	25
C	8	4	4	16
D	4	5	- 1	1
E	3	3	0	0
F	10	9	1	1
G	7	6	1	1
H	1	1	0	0
CH	2	8	- 6	36
AND	9	7	2	4
∑ 10	-	-	-	100

d_{and} = the difference between the two orders

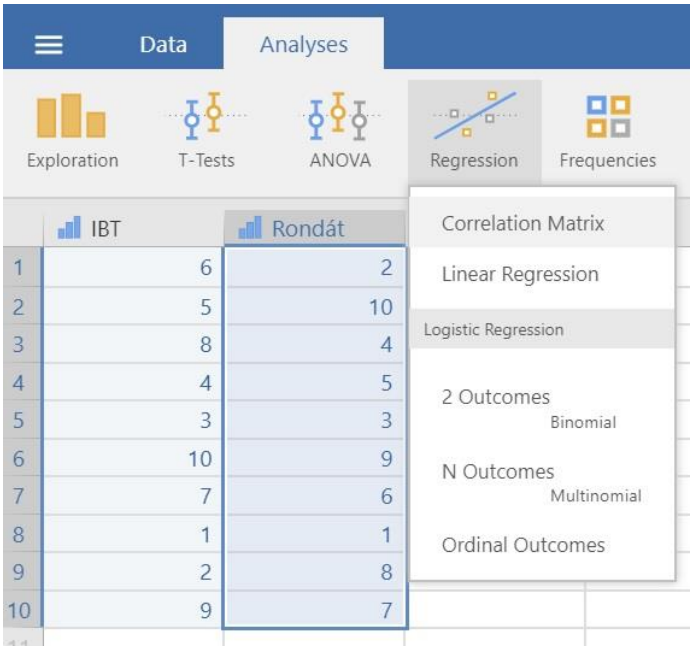
r_{with} = Spearman's rank correlation coefficient

$$= 1 - 6 \sum \frac{}{(2-1)} = 1 - \qquad \frac{6{,}100 \text{ th most common}}{10\,(10^2-1)} = 0.394$$

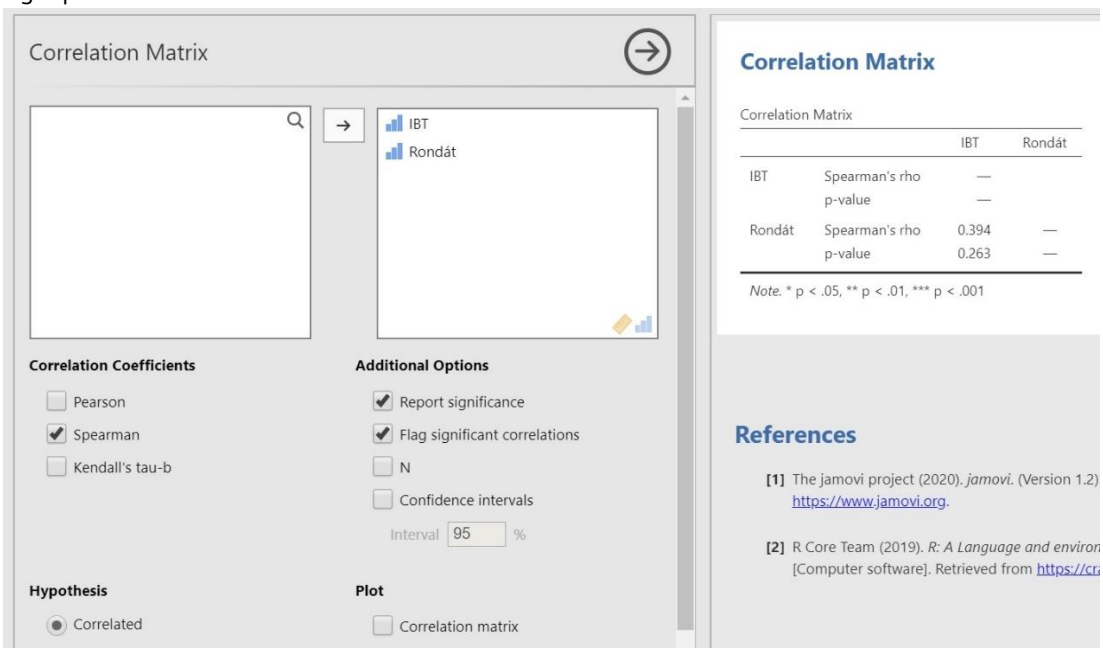
B) Statistical significance:

In the case of a random selection from the basic set, we can calculate**Spearman's test** rank correlation and value determination p determine whether there is a statistically significant dependence.

After entering the data, marking them as serial and assigning categories (IBT, rondát), we continue through the selection *Analyzes → Regression → Correlation Matrix*



After assigning data to categories and selecting the Spearman test, the results are displayed in the right part.



The value of the Spearman rank correlation coefficient is 0.394.
p = 0.263. Value *p* > 0.05. Based on the stated values, we cannot claim that the stated dependence exists.

C) Calculation procedureCyou vE(practical) significance (efect size)

The square of the correlation coefficient is called **coefficient of determination** (r_2). Its value tells us how many percent the observed factor contributes to the resulting dependence (Kerlinger, 1972).

Coefficient of determination $r_2 = 0.394_2 = 0.155$
The quality of the rondat and the result of the Iowa Brace test, and vice versa, is only affected by 15.5%.

TASK

Find out if there is a dependence between the performance of your study group in the cycling time trial in Bukovina and the order in the credit orienteering race there. Data can be found in the table with the list of lectures and seminars (time trial and OB)

THEORY

Four-field and contingency table, 2

Four-field table:

Group	Phenomenon occurred	Phenomenon did not occur	Σ
1	(AND$_0$) AND	(B$_0$) B	A + B
2	(C$_0$) C	(D$_0$) D	C + D
Σ	A + C	B + D	N

expected frequencies:

$$_0 = \frac{(+)(+)}{} \qquad _0 = \frac{(+)(+)}{}$$

$$_0 = \frac{(+)(+)}{} \qquad _0 = \frac{(+)(+)}{}$$

Calculation:

$$_2 = \frac{(-)2\ 0}{0} + \frac{(- 0\ )^2}{0} + \frac{(- 0)2}{0} + \frac{(- 0)2}{0}$$

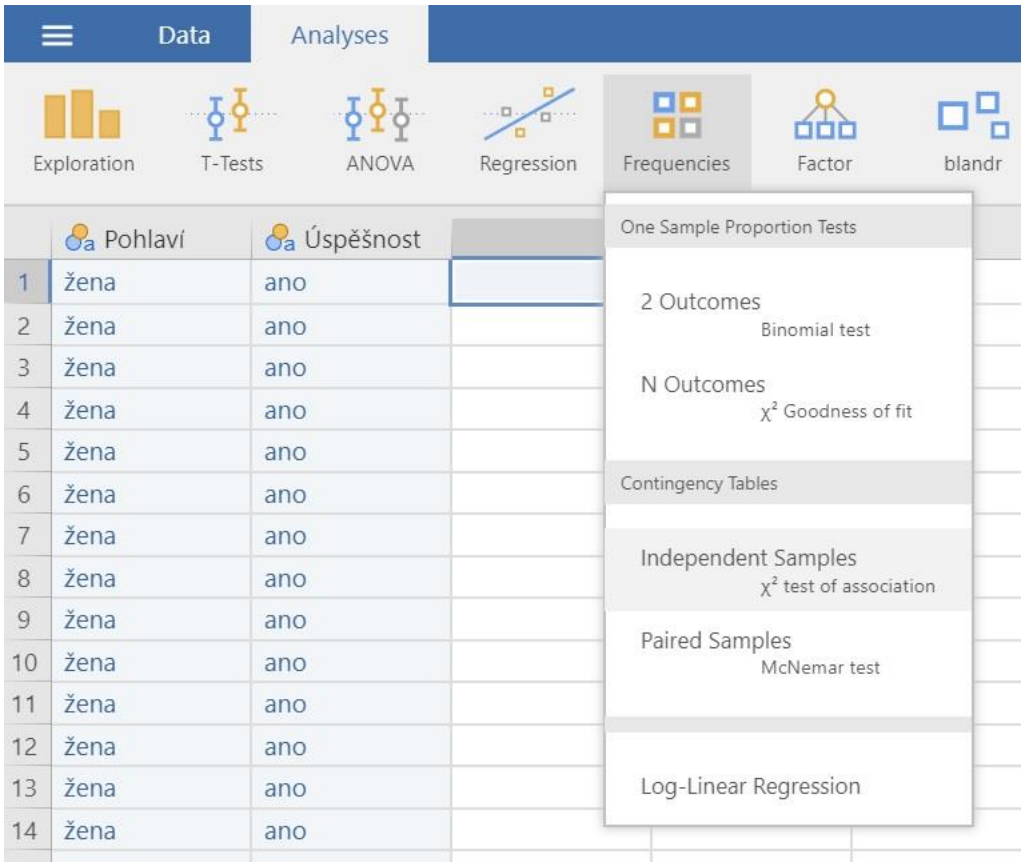
EXAMPLE

These students have not been able to meet the requirements of gymnastics in the last year. Is there a difference between them? (Is success in gymnastics influenced by gender?)

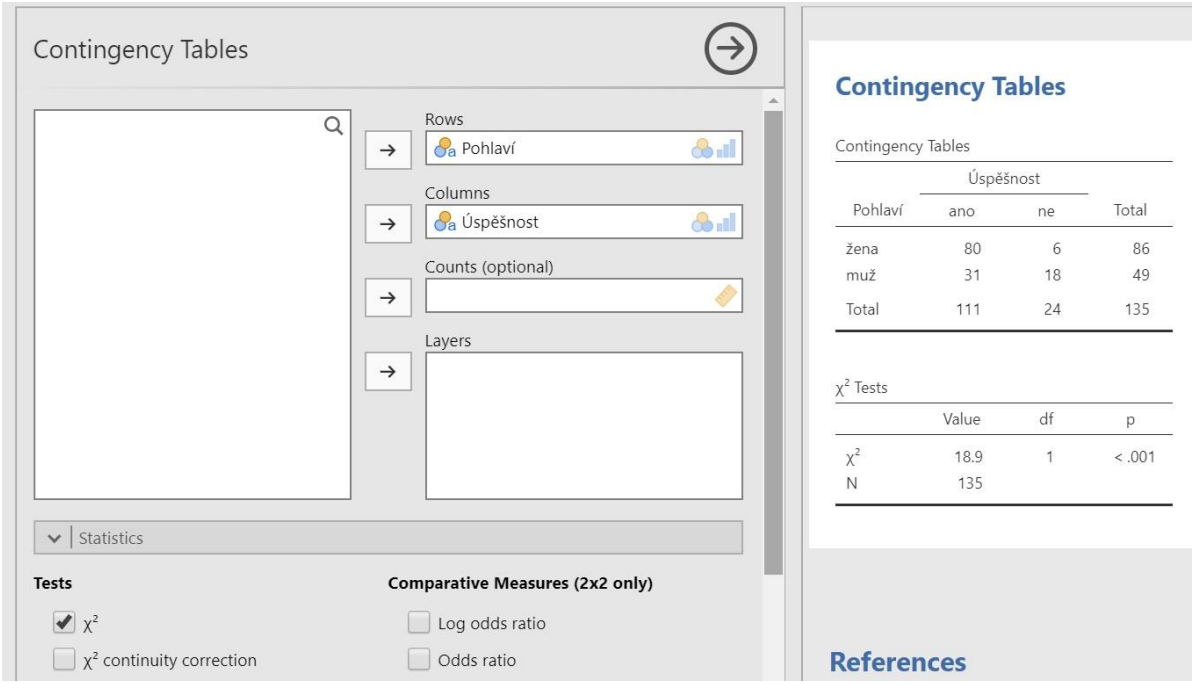
1st step. ZŠ	They did it	They didn't make it	Σ
Women	80	6	86
Men	31	18	49
Σ	111	24	135

Calculation: We enter the data in one column according to gender and in the other column according to success (yes / no). We mark the data as nominal and name the columns (Gender / Success). Then we continue through the elections:

Analyzes → Frequencies → Independent Samples (2 test of associations)



We assign data to rows (*Rows) and Columns and check the option* 2



The results are displayed on the right. The final value of the 2 test is 18.9
p <0.001. The difference between students is statistically significant, success in gymnastics is influenced by gender.

B) Calculation procedure **in**E**(practical)** importance (**effect size**)

Cramer's φ is evaluated as follows: φ

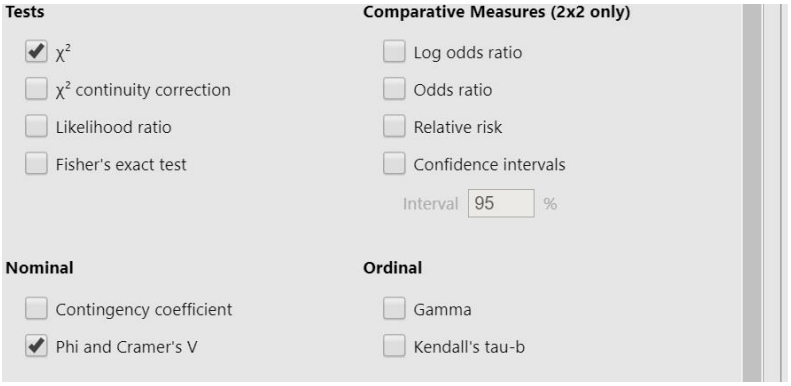
0, 10 .... small effect

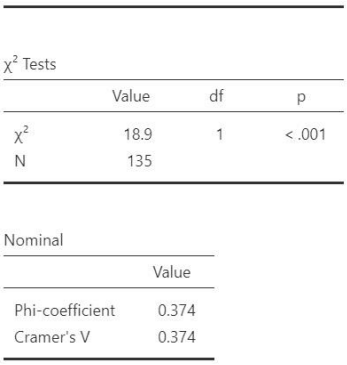
φ 0, 30 .... medium effect

φ 0, 50 .... large effect

It is calculated according to the formula for partial correlation = √ 2

For the calculation in the Jam program, check the option *Phi and Cramer´s V.*





χ^2 Tests

	Value	df	p
χ^2	18.9	1	< .001
N	135		

Nominal

	Value
Phi-coefficient	0.374
Cramer's V	0.374

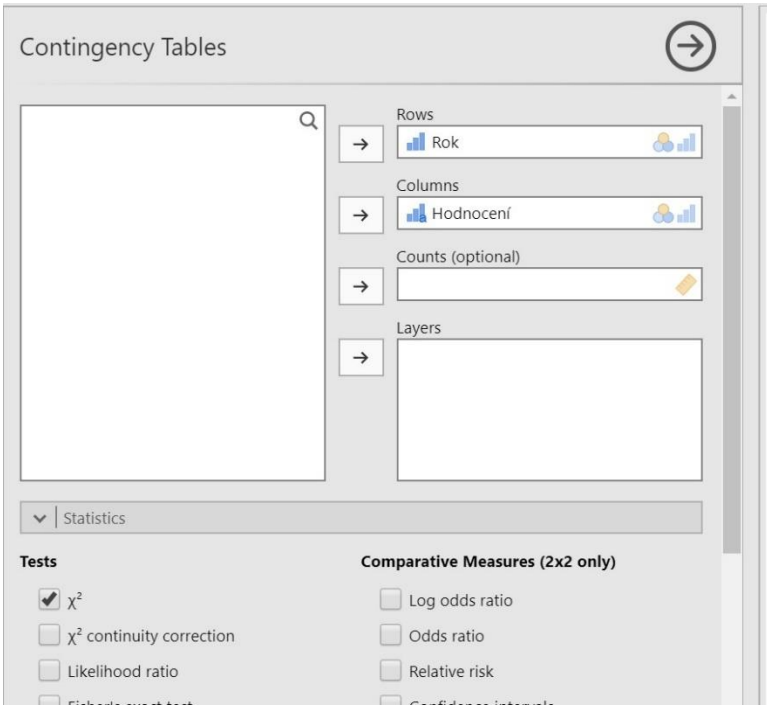
The result (0.374) is greater than 0.3 and therefore the observed difference is also materially (practically) significant, we are talking about a medium effect.

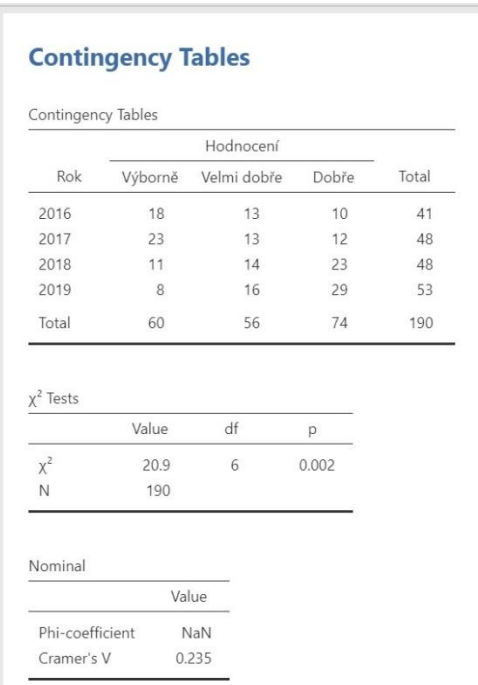
EXAMPLE PivotTable

We are interested in whether the marks from the Anthropomotorics exam are evenly distributed for about four consecutive years (H_0)

Years / stamp	Great	Very good	Good	Σ
2016	18	13	10	41
2017	23	13	12	48
2018	11	14	23	48
2019	8	16	29	53
Σ	60	56	74	190

When entering data, we proceed similarly to the four-field table.





Contingency Tables

Contingency Tables

Rok	Hodnocení			Total
	Výborně	Velmi dobře	Dobře	
2016	18	13	10	41
2017	23	13	12	48
2018	11	14	23	48
2019	8	16	29	53
Total	60	56	74	190

χ^2 Tests

	Value	df	p
χ^2	20.9	6	0.002
N	190		

Nominal

	Value
Phi-coefficient	NaN
Cramer's V	0.235

p <0.01. On the serpent of significance *99% of*we reject the null hypothesis (H_0) and we find that the marks are not evenly distributed in each year.

B) **IN**E**(practical)** importance (**effect size**)

The procedure is the same as the previous calculation for the four-field table.

Cramer's φ = 0.235 we can talk about a low / medium effect.

TASK

Assess which of the study groups is better at acrobatics, when mastering the throw forward is considered a crucial element (address statistical and factual significance)

	He managed	He couldn't
TV-Z	21	11
TV-Ov	15	6