

In this case the correlation between the ranks, hence the Spearman correlation, is very good. The Pearson correlation is not so high because the relationship between the variables is not linear.

fisher(86, 29, 44, 30)

SP (obtained direction) = 0.02021

SP (opposite direction) = 0.01596

SP (total) = 0.03618

this should be a one sided test so SP = 0.02

The null hypothesis was of no association between smoking and low birth weight. The Significance Probability is quite small at 0.03618. The null hypothesis can be rejected with a significance Probability as small as this. Obviously, having babies with low birth weight has not caused mothers to smoke during the pregnancy. Smoking is the cause, low birth weight the effect. The smallness of the significance probability implies a relationship, that smoking causes babies to have lower birth weights.

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Not JUST on the evidence presented here you need OTHER evidence (which exists) but this one does NOT show causality

d) Observed Frequencies O_F Expected Frequencies E_F

1465	146	33	28	1672	1469	130.5	36.25	36.25
764	52	22	27	865	760	67.5	18.75	18.75
2229	198	55	55	2537				

The value of the chi squared test statistic is given by $\sum \frac{(O_F - E_F)^2}{E_F}$

$$= \frac{(1465 - 1469)^2}{1469} + \frac{(146 - 130.5)^2}{130.5} + \frac{(33 - 36.25)^2}{36.25} + \frac{(28 - 36.25)^2}{36.25} + \frac{(764 - 760)^2}{760} + \frac{(52 - 67.5)^2}{67.5} + \frac{(22 - 18.75)^2}{18.75} + \frac{(27 - 18.75)^2}{18.75}$$