# Interpreting tables reporting tests of association and tests of effectiveness

## Transcript

Full resource: https://www.ncrm.ac.uk/resources/online/all/?id=20847

Chiara Dall’Ora: Hello and welcome to this tutorial on reading tables in quantitative papers.

In this tutorial, I'm going to walk you through how to read tables reporting associations between one or more variables and one or more outcomes and tables reporting on the effectiveness of an intervention on one or more outcomes.

I assume that you already have prior knowledge of study design elements, for example, whether a randomised controlled trial or a case controlled studies, and my focus will be only on reading and interpreting tables.

First, let's recall to mind the famous mantra, association is not causation or correlation does not imply causation. Observational studies typically shy away from establishing cause and effect relationships, although there are techniques to infer causality from observational studies, and focus instead on measuring associations. This means that they will run analysis that predict the value of the outcome variable for any given value of the predictor.

Let's make an example. You are reading a paper where the research question is, “What is the association between college students’ personality traits and their willingness to use AI to write their essays?” Once you have located the table, it is important to identify the point estimate for each association reported. The B coefficient value represents the difference in the predictive value of the outcome variable for each one unit change in the predictor variable.

Let's consider openness to experience. For every one unit increase in the openness to experience score, the score on the willingness to use the AI scale decreases by 0.03 points. The SE standard error of the B coefficients describes the spread of the points from the regression line, similarly to the standard deviation from the mean. In this case it is zero, meaning that there is virtually no spread of the points from the regression line. The standardised ß ranges from -1 to 1 and it is useful to compare all the variables as they are now on the same scale. The p value is the frequency probability of the observed data assuming the null hypothesis and since it is less than 0.05 the association we see for openness to experience is statistically significant.

We now look at odds ratios. Odds ratios compares the relative odds of the occurrence of the outcome given exposure to a variable. If the odds ratio values are below one, then when the predictor is present, the likelihood of the outcome reduces. If the OR value is exactly one, it means there's no association and if the value is above one when the predictor is present, the likelihood of the outcome increases.

Here's an example for the category lower managerial. The odds ratio is 0.97, it's below one. It means that compared to having parents in higher managerial jobs that you can see is the reference category in this analysis, students with parents in lower managerial jobs are 3% less likely to enjoy school. Always check what the reference category is if a variable is reported in categories.

The 95% confidence interval is important too. It estimates the precision of the odds ratio. It reports the interval whether through odds ratio for the population might be with a certain probability. If the values of the confidence interval overlap one, the association between the predictor and outcome is not statistically significant. In our example, the confidence interval limits are both under one, so the association is statistically significant.

It is always important to check whether the associations you see in a table are univariable or unadjusted or fully adjusted. Fully adjusted models report associations between one or more variables and the outcome while controlling for or adjusting for a number of other variables that have been deemed as potentially influencing the association between a predictor and the outcome. In our example, we can see that in the fully adjusted model, a number of variables were controlled for. So, what happens to our odds ratios when we do that?

Once the analysis includes control variables of age, gender and quality of peer relations, we see that the odds ratio for lower managerial socioeconomic status changes direction with the results now indicating that students with parents on lower managerial jobs are more likely to report enjoying school than students with parents on higher managerial jobs.

Importantly, we need to look at the absolute numbers in each category with and without the outcome as the 29% increase in the likelihood of the outcome will be quite different depending on these numbers. For example, if the number of students enjoying school is low to start with in both categories, a 29% increase will not look so striking anymore. Remember, always look at the descriptive data underlying these associations.

While the point estimates you find in tables reporting measures of effectiveness are the same that you would find in tables reporting associations, the interpretation of these tables typically found in experimental studies are fairly different to those of observational studies. The main focus here is on the effect size, which is the magnitude of the effect of the intervention on the outcome. You will find different point estimates depending on the outcome measure for the customers’ outcomes, you will typically find odds ratios, and for continued outcomes you will typically find mean differences.

We have a randomised controlled trial where some patients were randomised into the intervention group and were offered life coaching after a cancer diagnosis and some patients were randomised into the control group and received standard care which consisted of leaflets on managing life with cancer and a follow-up phone call from a psychotherapist one month post-diagnosis.

Researchers measure quality of life in both groups right after the intervention has been delivered at T0, then three months later, T1, and six months later, T2. They then compare the means and standard deviations between the intervention group and the control group, but they do it through regression modelling where they also control for imports and potential confounders like age, gender and other important variables.

Let's focus on the psychological dimension of quality of life. We can see that the mean has increased from T0 to T2 in both the intervention and the control group, which suggests that participants in both groups were typically able to cope psychologically well post-cancer diagnosis. But is there an effect of the intervention? We can see that the p value is 0.01, so we have to reject the null hypothesis that the mean psychological quality of life was the same for both groups. We can conclude that the intervention was effective in improving psychological quality of life for patients who have been diagnosed with cancer.

When reading results from an experimental study, remember that while statistical significance is important, the clinical importance must be considered too. For example, if an intervention was found to decrease the outcome by 1.5 points on a scale, would that be enough to upscale and implement the intervention? On a scale ranging from one to 100, it might be a negligible difference, while on a scale ranging from one to ten, it might be an important decrease.

Thank you very much for watching.

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