How to report a regression analysis

This document explains what needs to be included where when reporting a regression model(s) in a scientific article. An example of each of the sentences and paragraphs required in the introduction, method, results and discussion is given. On the right (in sans-serif text) is a commentary and explanation of each part.

The example chosen here is deliberately simple to keep things as short as possible: that the variables and measurements don’t require special explanations. In a real article you should assume that your reader has completed a psychology degree but is not a specialist in your topic. Any jargon or specialist terms should be briefly explained at the point they are first used.

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| INTRODUCTION |  |  |
| Achieving well in higher education is important to students, and university lecturers are concerned to provide the best possible advice to their tutees.  Previous surveys of students have found correlations between number of hours worked and student attainment (Bloggs, 2020). However earlier work had provided evidence that students who worked consistently across over the entire academic year performed better than students who massed their practice in the weeks before assessments (Jones, 2010). | The introduction contains the theoretical rationale for this study design. It usually has an inverted pyramid structure in which the opening is a very broad description of the domain or problem; each paragraph examines the existing literature, narrowing things down so that the final paragraph of the introduction … |  |
| Because students who work consistently may also accrue a greater number of hours, this study aims to disambiguate the effects of study duration and consistency. | The final paragraph of the introduction identifies something that we *currently don’t know* the answer to and need to collect more data on. This motivates running the study described in the methods. | 1 |
| We predict that both total hours studied and the consistency of study will be independent predictors of assessment performance. | The introduction should make at least one specific prediction that is tested in the results section. |  |

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| METHODS |  |  |
| […] | Based on the introduction it should be obvious why we want to run *this* study, and the choice of should be an ‘obvious’ way of answering the question posed. |  |
| We used linear regression to predict assessment performance from study duration and study consistency. We compared alternative models using a Bayes Factor. […] | Towards the end of the methods section there will be a paragraph describing the analysis to be used in *general* terms. You don’t need to describe each specific. model at this stage — just state the general approach. Optionally, this paragraph has a subheading like “Statistical methods” or “Data analysis”. | 2 |

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| RESULTS |  |  |
| Data were obtained for 300 student. Car weights ranged from 686 to 2460kg (mean = 1459, SD=443), and models in this sample had between 4 and 8 cylinders. Fuel economy ranged from 10 to 34mpg (mean = 20, SD=6). | We begin by describing the sample. In this example we give figures in the text, but this data could also be provided as a table (e.g. if there were many more variables to describe). | 3 |
| Figure 2 suggests… | Always refer to all figures somewhere within the text and… |  |
| … that both cylinders and weight were correlated with fuel economy. | …describe the general pattern of results that each figure shows. Imagine you are telling someone about the plot over the telephone: they don’t need to know details about what it looks like, or what colours are used. But they do want to know what you learned from it. | 4 |
| *Figure 1. Relationship between weight and fuel economy, coloured by number of cylinders.*  Chart, scatter chart  Description automatically generated | Figures should be included roughly where they are mentioned in the text (although some journals ask for them to be at the very end, after the references). Each figure should have a descriptive title with a figure number. All axes should be labelled clearly and include the units of measurement. | 5 |
| To test whether cylinders and weight were independent predictors of fuel economy, and to estimate the strength of these relationships… | It is important to give content and explain why a particular analysis is being used. This sentence links our hypothesis, methods, and the insights from Figure 1 with the analysis to come. | 6 |
| …we ran two linear regression models. Model A included only weight as a predictor; Model B included both weight and the number of cylinders. | We need to describe i) what technique(s) were used and ii) how they were applied. We state explicitly that we are using linear regression, that we ran 2 models, and which variables are the outcomes and predictors in each model. | 7 |
| Results are presented in Table 1. | Always refer to each table within the text. The APA states that model coefficients should be rounded to 2 or 3 decimal places. In this case, because the predictors are on a scale that leads to very small values, I have used 3 dp. Where 2dp is sufficient (e.g. for the beta values) this is preferred. It’s OK to use a slightly smaller font for tables where this helps with the format (minimum 10pt). See the workshop notes for more detail on the *content* of this table and the notes. | 8 |

*Table 1. Results for models A and B*

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|  | *Model A* |  |  |  | *Model B\** |  |  |
| Coefficient | Estimate | 95% CI | β |  | Estimate | 95% CI | β |
| Intercept | 37.287 | [33.452, 41.122] |  |  | 39.687 | [36.179, 43.195] |  |
| Weight | -0.012 | [-0.014, -0.009] | -10.46 |  | -0.007 | [-0.010, -0.004] | -6.25 |
| Cylinders | — | — |  |  | -1.508 | [-2.356, -0.659] | -5.39 |
| *R*2adjusted | 0.75 |  |  |  | 0.82 |  |  |

\* Bayes Factor in favour of Model B (vs Model A) = 22.7

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| Both additional weight and additional cylinders exerted a substantial negative influence on fuel economy. | APA style suggests that coefficients included in tables are *not* repeated in the text: Just summarise the size and direction of the effect. Here I write that both predictors exerted “substantial” influence because both the beta values are relatively large (-6 and -5 mpg respectively). We also know that both were independent predictors, based on the Bayes Factor. | 9 |
| Given these data—model B was 22 times more probable than model A, suggesting weight and cylinders are independent predictors of economy. | This is sentence is based on the Bayes Factor. Here there is positive evidence in favour of model B so the BF is > 1. Had that not been the case I would have calculated the inverse Bayes Factor—that is, the evidence in favour of model A—because people seem to find Bayes factors > 1 easier to interpret. | 10 |
| Diagnostic plots for model B did not indicate any problems with model fit or violations of assumptions. | This sentence would often be omitted (and simply assumed) in real articles, especially so in short reports. Either way, I suggest that code for diagnostics checks should be included in the data analysis code and shared with the publication. | 11 |

DISCUSSION

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| As expected, we found strong evidence that both car weight and number of cylinders were independent predictors of fuel economy. | We ALWAYS start the discussion with a restatement of the most important finding: in this case, that our prior prediction was confirmed. We do not repeat the BF value in the discussion, but the phrase “strong evidence” summarises the BF reported above. | 12 |
| […] | The rest of the discussion would serve to link these new findings to the previous literature and explain implications for theory or practical applications. |  |