

DEPARTMENT OF PSYCHOLOGY

HOW TO REPORT THE RESULTS OF STATISTICAL ANALYSES IN THE EMPIRICAL THESIS

In empirical theses, the results section aims to report, comment on, and interpret an adequate summary of the statistical analyses. For these analyses, the methods used must be clearly identified and the chosen statistical measures, type of test, etc. must be made explicit. For each analysis, both the purpose and any research hypotheses must be specified. Results (the guidelines summarized below refer to the manual of the American Psychological Association – APA, 6th ed. – to which the reader is referred for methodological questions) are normally reported in the text; however, when they involve more complex outcomes, such as the simultaneous study of multiple conditions and/or different dependent variables, it is appropriate to use tables and figures.

Results of a statistical test. General considerations

Reporting the results of a statistical test requires:

- the summary statistics of the sample under examination, the mean, *M* (in italics), and the standard deviation, *SD* (in italics). Generally, two decimal places are sufficient and are separated from the units by a decimal point. E.g.: “overall, participants were relatively young ($M = 20.31$, $SD = 2.54$).”
- the value of the test statistic for the sample under examination, hereafter referred to as the experimental (observed) value of the test, two decimal places are generally sufficient;
- the degrees of freedom (where applicable), two decimal places are generally sufficient;
- the p value, which is reported as follows:
 - when it is significant (i.e., conventionally less than 0.05), the exact value is reported, using two or three decimals (e.g., $p = .031$); however, when the p value is below 0.001, $p < .001$ is reported;
 - when the p value is greater than 0.05 (i.e., not significant), the exact value is reported with two decimals (e.g., $p = .46$);
- in the case of missing data, the percentage should be reported;
- Population parameters (not discussed further here) are denoted by Greek letters, while their corresponding sample estimates are denoted by italicized Latin letters.

The APA Manual further recommends that:

- a zero should be used before the decimal point for numbers below 1 when the value of the statistic can exceed 1. E.g.: Cohen's $d = 0.70$, $SD = 0.56$.
- a zero should *not* be used before the decimal point when the statistic cannot exceed 1, as in the case of correlations, proportions, or statistical significance levels. E.g.: $r(24) = -.43$, $p = .028$.
- it is good practice to report two decimal digits (always preceded by a decimal point), except for p values, as illustrated above.

For further notational specifications, see section 4.45 of the manual. The requirements specific to each of the analyses listed below are provided in addition to these general considerations.

t-test

The t -test is denoted by t (in italics). When reporting the results of this test, t is immediately followed by the degrees of freedom, reported in parentheses, the equals sign followed by the test value, and finally the statistical significance value, denoted by p in italics: e.g., $t(43) = 8.77$, $p < .001$.

In the case of a single sample, the population mean should be indicated. In the case of two samples, it must first be specified whether they are independent or paired. When reporting a significant difference on the test, its direction must be specified, that is, which condition is greater than, less than, or equal to the other, preferably together with the effect size.

Reporting the results of an independent-samples t -test implies that homogeneity of variance has been verified. There is no need to state that a test is two-tailed; however, in the case of a one-tailed test, its directionality must be made explicit. E.g. (a) “The effect of gender on the consumption of spirits was significant, $t(54) = 5.43$, $p < .001$, with males showing higher consumption than females” (left-tailed test). (b) “The 36 participants in the study, with a mean age of 27.4 years ($SD = 12.6$), were significantly older than the norm, whose mean age was 21.2 years, $t(35) = 2.95$, $p = .006$ ” (right-tailed test).

Chi-square test

The chi-square test is denoted by χ^2 . When reporting the results of this test, χ^2 is immediately followed by the degrees of freedom, reported in parentheses, the equals sign followed by the test value, and finally the statistical significance value, denoted by p in italics. E.g.: “Opinions in favor of legal recognition for unmarried couples were found to be related to the respondent's gender ($\chi^2(1) = 4.12$, $p = .04$).

Correlation

In the text, the observed value of each bivariate correlation (denoted by r , in italics) must be reported together with the corresponding degrees of freedom ($N-2$) in parentheses and the significance level (p). E.g.: “The two variables were found to be correlated, $r(55) = .49$, $p < .001$.” In the more complex case of many variables, it is advisable to use a table presentation, appropriately specifying partial correlations if these were included in the analysis. Where the

correlations are based on the same sample size, the latter can be indicated in the caption, and significance can be expressed using one or more superscript asterisks.

Regression

It is standard practice to report the adjusted proportion of variance explained, together with the corresponding observed value of the *F* test (in italics), including the pair of degrees of freedom, reported in parentheses and separated by a comma, and the significance value (*p*). It is essential to report the observed value(s) of the regression coefficient(s) (standardized values, denoted by β , are preferable in the case of multiple regression), together with the results of the corresponding *t*-test(s), degrees of freedom, and *p* value. E.g.: “Social support explained a significant proportion of the variance in depression scores, $R^2 = 0.12$, $F(1, 225) = 42.64$, $p < .001$. Social support produced a significant decrease in depression scores, $\beta = -0.34$, $t(225) = 6.53$, $p < .001$.”

ANOVA

ANOVA results are expressed in terms of the observed values of the *F* test (in italics), each accompanied by its own pair of degrees of freedom, reported in parentheses and separated by a comma, together with the *p* value. E.g.: “Anxiety levels showed a significant effect of both treatment, $F(1, 145) = 5.43$, $p = .02$, and the interaction between treatment and therapist attitude, $F(2, 145) = 3.24$, $p = .04$.”

Tables

All tables must be numbered sequentially and referenced in the text. Each table must have its own title, in italics, with any source indicated separately from the title. Each column (and, if necessary, each row) must be identifiable with an appropriate descriptive heading, the first letter of which must be capitalized. Abbreviations for standard terms (*M*, *SD*, etc.) may be used without further explanation; otherwise, a caption is required, as is also the case when superscript asterisks are used to indicate different levels of significance (e.g., a value of .19* reported in a table requires that the meaning of the asterisk be given in the caption; conventionally, * $p < .05$, ** $p < .01$, *** $p < .001$). In general, the caption includes three types of notes: general notes, referring to the table as a whole; specific notes, referring to particular rows or columns; and probability notes, which specify the levels of significance/probability.

Figures

All figures must be numbered sequentially and referenced in the text. The figure caption must be placed below the figure and must include the title along with a brief description, if applicable.