Review of: "Intersections of Statistical and Substantive Significance Under a True and False Null Hypothesis"

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The manuscript focuses on an important problem, namely the misunderstanding and abuse of p-values and statistical inference, for students and applied researchers who are not very familiar with statistics. The manuscript is understandable and well-written. However, there are some mistakes in the current document which I pointed out below.

1- In the section on “Methodology”: It is important to give the alternative hypothesis H_1 in addition to the null hypothesis H_0. So, the author should add H_1 to this section.

2- In the section on “Statistical Significance”: The null hypothesis H_0 should be written as H_0: mu_T - mu_C = 0. The sample averages (x^bar_T and x^bar_C are estimators of mu_T and mu_C, respectively, and do not appear in H_0).

3- In the section on “Statistical Significance”: The computation of the p-value depends on how the alternative hypothesis is stated; i.e., H_1: mu_T not equal to mu_C, or better, H_1: mu_T > mu_C. Without H_1, the p-value cannot be computed. Therefore, in the section on “Methodology”, next to H_0, H_1 has to be given. Also, it is a good idea to write the formula for the computation of the p-value in the section on “Methodology”.

4- Another important point in the manuscript is that we can never prove that H_0 is “true”. We either reject H_0 and accept H_1, or we don't reject H_0; but failing to reject H_0 does not mean that H_0 is true. We simply don't have enough data to reject H_0. So, the interpretations of the statistical tests should be written clearly in this way, with an emphasis that we cannot accept H_0 as “true”.

5- In order to compare two treatments, it is better to use a paired-t test. Hence, H_0 will be H_0: mu_d = 0, and H_1: mu_d > 0. Mu_d is estimated through the sample average of the differences obtained from two populations. In order to use the paired-t test, the same number of samples has to be obtained from the two populations. Under the assumption of equal variances, the pooled variance can still be used, though the formula for the pooled variance has to be given.

6- The power of the test should be better explained and analyzed.