

# Practical vs. Statistical Significance

By Jim Frost

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You've just performed a hypothesis test and your results are statistically significant. Hurray! These results are important, right? Not so fast. Statistical significance does not necessarily mean that the results are practically significant in a real-world sense of importance.



In this blog post, I'll talk about the differences between practical significance and statistical significance and how to determine if your results are meaningful in the real world.

## Statistical Significance

The null hypothesis testing procedure determines whether the sample results that you obtain are likely if you assume the null hypothesis is true for the population. If the results are sufficiently improbable under the null hypothesis, then you can reject the null hypothesis. In other words, you can say that your results are statistically significant.

You use  $p$ -values to determine statistical significance in hypothesis tests such as  $t$ -tests, ANOVA, and regression coefficients among many others. Consequently, it might seem logical that  $p$ -values and statistical significance relate to importance.

However, you can't assume that statistical significance equates to practical significance because effect sizes that are trivial in the practical sense can be highly statistically significant.

Here's why small effect sizes can still produce significant  $p$ -values:

**You have a very large sample size.** As the sample size increases, the hypothesis test gains greater statistical power to detect small effects. With a large enough sample size, the hypothesis test can detect an effect that is so minuscule that it is meaningless in a practical sense.

**The sample variability is very low.** When your sample data have low variability, hypothesis tests can produce more precise estimates of the population's effect. This precision allows the test to detect tiny effects.

Statistical significance indicates only that you have sufficient confidence to reject the null hypothesis. It is a mathematical definition that does not know anything about the subject area and what constitutes an important effect.

## Practical Significance

While statistical significance relates to null hypothesis testing, practical significance refers to the magnitude of the effect.

Null hypothesis testing cannot tell you whether the effect is large enough to be important in your field of study or in life itself.



Instead, you need to apply your subject area knowledge and expertise to determine whether the effect is big enough to be meaningful in the real world.