Statistically significant results are those that are understood as not likely to have occurred purely by chance and thereby have other underlying causes for their occurrence - hopefully, the underlying causes you are trying to investigate!

Whenever a statistical analysis is performed and the results interpreted, there is always a possibility that the results are purely by chance (random error). This is an inherent limitation of any statistical analysis and cannot be done away with. In addition, mistakes such as measurement errors may cause the experimenter to misinterpret the results (systematic error).

Fortunately, the probability that the process was simply a chance encounter can be calculated, and a minimum threshold of statistical significance can be set. If the results are obtained such that the probability that they are simply a chance process is less than this threshold of significance, then we can say the results have a high probability of not being due to chance. Note that the probability is never zero; statistical tests are never 100% certain.

Threshold levels merely indicate the risk we are willing to take when it comes to accepting or rejecting a particular hypothesis.

Source URL: https://explorable.com/statistically-significant-results

Links:
[3] https://explorable.com/type-i-error