

Interpreting Research Results: Statistical versus Clinical Significance

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The result section is the fundamental component of a research paper, as it is the primary focus of the reader and may serve as the foundation for the generation of evidence. Therefore, it is very essential to accurately analyse the research results to address the research question and achieve the study objectives. The word “significance” is used to express the considerable importance of medical research, either in terms of “statistical significance” or “clinical significance”. Among researchers, there is an increasing trend of reporting statistical significance while analysing the results. However, it is time to think whether a researcher should completely rely on statistical significance for developing a good research paper. Meanwhile, what weightage does clinical significance hold?

In the current context, there exists an ongoing debate over whether statistical or clinical significance should be prioritised while interpreting the research findings. Some questions may arise like: whether the change observed in research outcomes through statistical analysis really exists, or is it only due to chance occurrence? If the change really exists, does it hold any importance on clinical practice? At the same time, one must cross-check if any measurement error has occurred while undergoing statistical analysis.

In research, statistical significance measures the probability of the null hypothesis (there is no relationship) being true in relation to the acceptable degree of uncertainty about the actual response.¹ It indicates that a relationship between variables is not due to chance. Probability value (p-value) is used to measure the strength of evidence against null

hypothesis in statistical hypothesis testing. In many published studies, the significance level is set at 0.05 where a small p-value (<0.05) provides strong evidence against the null hypothesis, meaning that the observed results are unlikely due to chance alone. A high p-value (≥ 0.05), on the other hand, suggests that there is little evidence against the null hypothesis, implying that the results may have occurred by chance. However, the significance level value must be carefully set by the researcher depending upon the nature of his/her study, because it determines the outcome of a statistical hypothesis test.²

Clinical significance is the practical importance of a therapeutic result, indicating its real-world applicability and impact on patient outcomes. It incorporates factors like impact magnitude, patient-reported outcomes, and the clinical setting in which treatment is used. Statistical analysis alone cannot determine the clinical significance of an observed effect. If a study population is small, a clinically meaningful difference may fail to be statistically significant. Furthermore, in a large study population, small differences can be detected as statistically significant, although being clinically irrelevant. This leads us to the methodological aspect of sample size calculation that links clinical relevance and statistical significance.³

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A statistically significant finding without clinical relevance may induce clinicians to pursue interventions that do not give real benefits to patients, potentially wasting money and time. Therefore, clinical experts should guide patient management by judging whether a statistically significant difference is clinically important. Let us see one example of a new caries preventive protocol that may show a statistically significant reduction in incidence of dental caries among children. However, if the actual reduction in incidence is only one cavity per thousand children per year, the clinical implications might be negligible. It is of utmost importance to understand the point at which treatment becomes clinically useful. Interventions must result in significant improvement in quality of life, patient satisfaction, or overall health outcome.

Therefore, to bridge the gap between statistical and clinical significance, researchers must adopt a comprehensive approach in their reporting. This involves not only presenting p-values but also effect sizes, confidence intervals, and practical implications of the findings. Additionally, qualitative data that captures patient experiences and perceptions should be integrated to provide a

holistic view of treatment effects. In research, effect size is the estimated magnitude of the predicted difference or the strength of association between two groups.⁴ Confidence interval shows the range of values anticipating the true estimate to fall between if the study is repeated many times.⁵

Journals should also encourage authors to include discussions on clinical relevance and the potential impact of their findings on everyday dental practice. This includes outlining the practical application of results and offering guidelines for clinicians to interpret and utilise the data effectively. As dental practitioners, our goal is to provide the best possible care informed by robust research. By recognising the distinction and interplay between statistical and clinical significance, we can better assess the utility of research findings in our practices. Emphasising both aspects will lead to more informed clinical decisions, ultimately improving patient outcomes and enhancing the quality of care in dentistry.

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