Beyond Statistical Significance

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A study claims that a certain procedure reduces overall orthodontic treatment time by two months and that this result is "statistically significant". It sounds promising, and the numbers back it up. But before drawing any conclusion, it may be worth asking what "statistically significant" actually means here and whether it is enough on its own to guide our decisions.

This question sits at the heart of the American Statistical Association's statement published back in 2016.[1] It raises the concern that complex research findings are often being reduced to simple labels, "statistically significant" or "not significant." The statement did not argue against any statistical analysis or advocate any particular alternative. Instead, it reminds us that scientific conclusions should not rely solely on whether a statistical threshold has been crossed.

Every study result is an estimate, not a final answer. It reflects assumptions and variation. It cannot tell us with complete certainty how large the true effect really is or how well it would hold in another sample. Study findings reflect the data collected under specific conditions and assumptions, and they should be interpreted with those limits in mind.

Back to our example. Comprehensive orthodontic treatment typically runs anywhere from twenty to twenty-five months. For a treatment that runs nearly two years, two months is a very modest change. Statistical significance tells us the result is unlikely to be due to chance. It does not tell us whether the result is large enough to matter.[2] The more useful questions to think about while going through the result section are: How large is the effect? How precise is the estimate? Does the size of the change actually matter clinically? These questions push us toward a more honest understanding of what the evidence is really saying.[3]

Years after the American Statistical Association's statement, although awareness has increased, everyday research practice has changed little.[4] Thresholds continue to shape how results are mostly reported and read. A statistically significant result opens a conversation. It does not end one. The next time a paper reports a 'statistically significant' finding, it is worth pausing and asking whether it makes a difference in the real world.

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