

The Trend to Use the Word *Trend* to Describe Nonsignificant Data in Orthopaedic Literature

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INTRODUCTION:

Usage of the word “trend” for statistical judgement when results are not actually statistically significant has been recognized in multiple fields of medical literature. In some studies, when the p-value turns out to be slightly higher than 0.05, the authors will claim that “there is a trend toward significance.” However, there does not appear to be a meaning of the word “trend” defined as “a difference that is almost, but not quite statistically significant.” Orthopaedic literature often utilizes a p-value to determine if there is a statistically significant difference between two or more groups that are being tested. “Trend” is sometimes used to describe significant findings when they are not statistically significant.

The purpose of this study was to determine if there has been increasing use of the word “trend” to describe nonsignificant findings in orthopaedic publications.

METHODS:

Journals with orthopaedic associated publications indexed in MEDLINE were identified with the search terms: currently indexed (orthopedics OR orthopaedics OR sports medicine OR orthopedic OR orthopaedic). This yielded 128 human orthopaedic related journals that were searched with the following keywords in the PubMed Advanced Search Builder: (“orthopedics”[Title] OR “orthopaedics”[Title] OR “bone”[Title] OR “joint”[Title] OR “foot”[Title] OR “hand”[Title] OR “musculoskeletal”[Title] OR “muscle”[Title] OR “orthopaedic surgery”[Title] OR “orthopedic surgery”[Title] OR “sports medicine”[Title] OR “orthopedic trauma”[Title] OR “pediatric orthopaedics”[Title] OR “pediatric orthopedics”[Title]) AND (“1985/01/01”[Date - Publication]: “2022/12/31”[Date - Publication]). A total of 59,839 unique abstracts were found. Each use of the word “trend” was labeled as either not for statistical judgement, for statistical judgement without a p-value, for statistical judgement with a nonsignificant p-value, or for statistical judgement with a significant p-value. “Trend” when used for statistical judgement without p-value or for statistical judgement with a nonsignificant p-value was also labeled “NS Trend.”

RESULTS:

Overall, the word trend was used in 1,029 abstracts (1.72%). “NS Trend” was used in 611 abstracts to describe significant results when the p-value was not given or not actually significant (1.02%). There was a strong correlation over time with increasing use of the word “trend” in orthopaedic abstracts ($r=.96$), and a strong correlation over time with increasing use of “NS Trend” in orthopaedic abstracts ($r=.94$). Both the use of “trend” and “NS Trend” were found to be significantly increasing over time ($p<.001$ and $p<.001$, respectively). Of the 1,029 abstracts that used “trend,” 176 (17%) used “trend” for statistical judgement with a nonsignificant p-value (> 0.05). P-values accompanied with these 176 uses ranged from 0.05 to 0.943 with an average of 0.117 (SD = 0.131), 95% CI [0.0977, 0.1360]. The journals *Bone* (74), *Osteoporosis International* (55), and *Journal of Bone and Mineral Research* (48) contained the most uses of “NS trend.”

DISCUSSION AND CONCLUSION:

Intentionally or not, there has been misuse of the word “trend” to suggest nonexistent statistical significance in orthopaedic literature. Authors may be feeling pressure to ensure their data is not just clinically relevant, but statistically significant, too. An analysis of 318 abstracts accepted to the American Academy of Orthopaedic Surgeons (AAOS) annual meeting showed a preference toward publication of articles with a significant finding. Abstracts with a significant finding had an odds ratio of 2.10 over other articles to be published within 5 years. This is one potential piece of evidence that explains why the misuse of the word “trend” continues to increase. It should be noted that statistically significant results do not automatically imply clinical significance. A straightforward treatment recommendation will not be produced from every clinical trial and statistically significant results do not automatically imply clinical significance. It is important to point out that the p-value is just one statistical metric that can be utilized; not an all-encompassing tool to make complete conclusions. The p-value can be improperly used for conclusions about the strength of an association and should be used cautiously when the sample size is small. Misinterpretation of statistical analyses can lead to research conclusions that push readers toward inappropriate treatments. This can especially be detrimental when the treatment that is deemed to have a superior outcome is associated with risks. It is imperative that we clearly communicate our statistical findings and not use ambiguous language in orthopaedic literature.

The word “trend” is increasingly being used in orthopaedic literature, including suggesting statistical significance when there is no statistical significance. When presenting and discussing results in orthopaedic literature, the word “trend” should not be used to describe results that do not meet statistical significance.

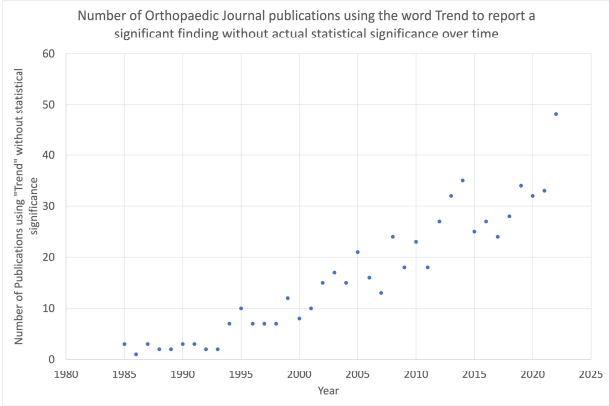


Table 1: Examples of "trend" when used to report a statistical finding without actual statistical significance: "No Trend"

Text From Abstract	p-value	Point Illustrated	Journal	Year
A trend was found toward lower revision surgery rates within 17% improved trend being noted across (postoperative) range of 1.81 versus 2.25, $P = 0.05$, and higher rates of failure 9% versus 7%, $P = 0.009$ in the DBM group compared with the BFP group.	0.09	Trend used for statistical judgement with no statistical significance ($p > 0.05$)	Journal of the American Academy of Orthopaedic Surgeons, Clinical Research	2018
Despite length of stay not depicted a trend toward being shorter following the first 1.38 to 11.26, $P = 0.00$ and second stage 1.05 to 0.81, $P = 0.07$ for patients in the RC group.	0.166	Trend used for statistical judgement with no statistical significance ($p > 0.05$)	The Journal of Arthroplasty	2022
Adjusting for time to reoperation, NIV spacer demonstrated greater PIV spacer compared with ACS spacer ($p = 0.04$), and a trend toward greater survival compared with ACS spacer ($p = 0.06$).	0.066	Trend used for statistical judgement with no statistical significance ($p > 0.05$)	Knee surgery sports traumatology official journal of the ESSKA	2021
The study observed an increasing trend in manual activity of DFB and RFB in ACL-R individuals during ATW training at increased knee depths.	None	Trend used for statistical judgement with subjective statistical significance (no p-value given)	Journal of sport rehabilitation	2022
Compared with control group, the additional time in OIG group depicted a gradual trend of diminished microvascular and osseous biomechanical properties along with abnormal bone remodeling, which might be responsible for the reduction of bone formation from the cartilage surface to the subchondral bone and thus leading to the cartilage degeneration and accelerated FDF progression.	None	Trend used for statistical judgement with subjective statistical significance (no p-value given)	Cartilage	2022