## Editorial

## Publication Bias and the File Drawer Effect: Implications for **Evidence-Based Dentistry**

Let's suppose that a particular antimicrobial agent has no real effect on mutans streptococci. If, however, 20 clinical trials of the agent each establish an a priori level of significance of  $\alpha$ =.05 for some critical statistical outcomes measure, then we could expect that 1 study will incorrectly find that the antimicrobial has an effect. What happens if only that one study is published? The published "truth" would lead us to believe that we should be using the antimicrobial to combat dental caries when, in fact, the opposite is true.

Such is the risk posed by publication bias and the "file drawer effect." Researchers are less likely to submit studies for publication if they do not show statistically significant results. Those data are tucked away in file drawers, never to see the light of day. Authors who do submit their non-significant work to peer-reviewed journals face the prejudiceconscious or not-of editors and reviewers who are less than excited about publishing studies that accept the null hypothesis. In contrast, studies that find significant results are not only more likely to be published, they are more likely to be moved up in the publication queue. This "time lag bias" allows the spurious results to appear in print earlier than other manuscripts submitted at the same time.

Studies with positive results also often benefit from a "language bias," which increases the likelihood that they will be published in English and thus made available to a wider readership. It is even possible that the study will be published more than once, perhaps in a slightly different format or in a different language. This "multiple publication bias," coupled with the language bias, increases the number of times the study will be cited by other authors.

All of this leads to the issue of systematic reviews and meta-analyses. A well-done systematic review should not rely solely on searching electronic databases, such as MED-LINE or CINAHL. These databases, excellent though they may be, are reflective of publication bias and the file drawer effect. A systematic review of biased data is, itself, a biased review. Given that systematic reviews and meta-analyses are at the top of the hierarchy for quality of evidence, then we must be critical of how their data were obtained. Authors seeking to reduce sources of bias in their systematic reviews must look for the "dark data"-the unpublished findings lurking in file cabinets, old floppy disks, and brief cases. This is a time- and labor-intensive process that must be undertaken to ensure that all the available data are included in the reviews that are beginning to have a major impact on our treatment decisions through the rubric of evidence-based dentistry. The next time this journal or any other publishes a study with non-significant findings, appreciate the implications for future practice.

AMadai Editor–in–Chief

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