



## What is selective reporting bias?

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Let's move on to selective reporting. And let's in a way talk about the elephant there is in the room.

Selective reporting is important, and many people still ignore the issue. And it's one of the root causes of the current replicability crisis we are facing not only in biomedical sciences, in the social sciences, but it's clear that it's also happening in other types of sciences.

And this is, with some exaggeration, how it might work. We all know that positive results are wonderful. They're really wonderful. We love them. We love them so much that hardly any negative results are being published anymore. And why is that? That is because they're bringing us high impact publications and they get a lot of citations, good for our H-indexes, and so on. And if you're lucky, you get a lot of media attention which are public, a positive finding, especially when they are quite spectacular. And all these three goodies, they bring you the next grant and hopefully in the end, tenure as an academic professor.

Now, in the cynical way, the good news is, that cutting corners and worse aspects of FFP and questionable research practices can help you to get positive results. In fact, that's their only purpose. They're wonderful tools in the toolkit to bring you positive results. And the pressure from your personal interest and sometimes also your sponsor interest make you utilize these tools, these forbidden tools, to get positive results because they're so wonderful and then these positive results are often false and because they're false, they're not that easily reproducible. That's basically in the simple way, the story.

And this is one of my favorite slides. I'll dwell a few minutes on it. It's really wonderful because it's so rare that you can see what's happening. And here you can see what's happening.

These are 105 randomized clinical trials on drug treatment for depression. They compare the real stuff to a placebo drug. And this is at the FDA level. The Food and Drug Administration in North America. The FDA, they don't look at papers. They don't read papers. They look at data and they analyze data. So they ignore all the stories people are telling about the data. They look at the data and they analyze them for themselves. And that judgment is, that is the gold standard judgment in this story, is that about half of these trials are positive, in the sense that the real drug works better than the placebo and the other one is negative in the sense that there are no differences. So this is how reality is.

Now when you look at this cohort of 105 randomized clinical trials, a few years down the line, you see that with one exception all the positive trials have been published. And only half of the negative trials. This is the first distortion. We call that publication bias. Normally, we only see this. Normally, we don't have that. That is why this is such a wonderful example.

But it gets worse. When you look more closely at the papers, it seems that some of the negative papers are written down as whether they were positive. The FDA said, this is a negative study, the paper says, this is a positive study. And why is that? The answer is cherry picking. Outcome reporting bias. In a trial, you have also always many outcomes. When you ignore the negative ones, and polish the positive ones and present only these in the publication, you get a wonderful positive story for a negative study.



But it gets worse. There is also a thing called spin. We have all these funny words. I have a beautiful paper in my laptop explaining 105 ways to make you feel good about a non-statistically significant result. There was a significant trend. It was almost significant. There was a clear trend. And so on and so forth. We call that spin. Using words to tone down the negativity of the study and to uprate the positivity of the study and these are the yellow spots. So many of these negative studies, they're polished. Even after the cherry picking. And hardly any negative studies are left.

And when you take one more step, the step of the citation bias, the selective citation, my last two PhD students, did a PhD degree on selective citation. One of them will defend their thesis tomorrow. And they found that positive studies are cited three to five times more likely than negative studies.

We knew that already because that's the reason we published these positive studies. And that's the reason journals love positive studies so much. But what you see then is that the green bullets that grow in the citation oeuvre and the rare red ones left, they shrink. And when you compare this column to that column, you see what's happening.

It's not a valid track record we see in the literature, and this is an example where we know it. Like many drug trials. But normally, we don't know it. We don't have a clue because we don't have this column at all. So that's the reason, I think, that selective reporting is this elephant in the room.