

Today our friend Jay Bhattacharya, who's now acting CDC director in addition to directing the NIH, responded on Twitter/X to a post about the embarrassing "replication crisis" in science.

The replication crisis refers to the ongoing problem -- which first gained prominence in the early 2010s, but we can find concerns about it earlier than that -- whereby a significant portion of published scientific research cannot be reliably replicated by independent researchers using the same methods and conditions.

You conduct research using a particular method, I ought to get the same results when I use that method. If I don't, something is wrong.

A large-scale effort, named The Reproducibility Project: Psychology, led by something called the Open Science Collaboration, attempted to replicate 100 experiments from top journals in 2015. Only 36 percent produced statistically significant results in line with the originals, and of those, the average effect size was only about half of what was initially reported.

That's psychology, you may say. Show us the hard sciences!

Well, in 2016, *Nature* published a survey of over 1500 scientists, more than 70 percent of whom reported failing to reproduce another scientist's experiments. Over half couldn't reproduce their own!

And among them were 703 scholars in biology, 203 in medicine, 236 in physics/engineering, 106 in chemistry, and 95 in earth/environmental sciences.

The *Nature* survey wasn't an outlier: results like these have been found numerous times and across academic disciplines.

In cancer research, Amgen, a biotech firm, attempted to replicate 53 "landmark" preclinical studies in 2012. These are studies that had influenced major drug pipelines. A mere six of them (about 11 percent) could be reproduced, despite close collaboration with the original authors. This included foundational work on cancer pathways that had generated plenty of investment funds but had led to dead ends.

The Reproducibility Project: Cancer Biology, a multi-year effort that concluded about five years ago (and which cost \$2 million and took eight years), sought to replicate high-impact papers (but could fully assess only 50 out of 193 because of incomplete methods reporting). Fewer than half were reproducible. In some cases, the size of the reported effect shrank dramatically or even vanished altogether during the replication

process.

Alzheimer's disease research has seen massive failures: despite over \$3 billion in annual U.S. funding, 99 percent of clinical trials fail to show drug efficacy over placebo. There are numerous reasons for this, but Charles Piller's 2025 book *Doctored: Fraud, Arrogance, and Tragedy in the Quest to Cure Alzheimer's* tells a horrific story of academic fraud that played out over nearly two decades and sent Alzheimer's research down a hopeless dead end.

A landmark 2006 *Nature* study, cited thousands of times, was finally retracted in 2024. Hundreds of papers pushing a particular approach to the disease were flagged for image manipulation and other irregularities.

In short, it's a mess.

As Jay put it:

The reproducibility crisis is a signal that science needs a cultural reset.

Status is [supposed to be] conferred to scientists by the scientific community based on their willingness to collaborate with other scientists in pursuit of the important truths.

Now it is conferred based on ability to signal alignment with favored political agendas, or on arbitrary metrics of influence, funding levels, and the volume of output, regardless of its importance, reproducibility, or quality.

Lesson: scientists are not a new clergy, they are not gods walking on earth. They are human beings like everyone else, and have all the moral foibles (as well as the potential for greatness) that the rest of us do.