research highlights

REPRODUCIBILITY

Power failure

PLoS Biol. <http://doi.org/b4r4> (2017)

MINA DE LA O/STONE/GETTY IMAGES

Replication failure is partly the result of power failure — underpowered studies (coupled with selective publication of only positive results) substantially exaggerate published effect sizes. The nascent field of metascience is playing an important role in quantifying the magnitude of the problem and pointing to solutions.

A research paper by Denes Szucs and John P. A. Ioannidis analyses nearly 4,000 cognitive neuroscience and psychology papers published in 18 different journals to estimate effect sizes and statistical power. The authors find that studies in both disciplines are underpowered due to small sample sizes, a problem that is more pronounced for cognitive neuroscience. Low statistical power increases the probability that a study reports false-positive findings. Indeed, Szucs and Ioannidis estimate that more than half of statistically significant findings in psychology and cognitive neuroscience are likely to be false. Finally, they find that higher journal impact factors are associated with lower statistical power.

The authors make a number of suggestions for addressing the problem, including compulsory power calculations with minimally required power levels.

Stavroula Kousta