This is a post-print. Official reference: Nuijten, M. B., van Assen, M. A. L. M., van Aert, R. C. M., & Wicherts, J. M. (2014). Standard analyses fail to show that US studies overestimate effect sizes in softer research. *PNAS, 111(7),* E712-E713.

Standard analyses fail to show that US studies overestimate effect sizes in softer research

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Fanelli and Ioannidis (1) have recently hypothesized that scientific biases are worsened by the relatively high publication pressures in the United States (US) and by the use of "softer" methodologies in much of the behavioral sciences. They analyzed nearly 1200 studies from 82 meta-analyses and found more extreme effect sizes in studies from the US, and when using soft behavioral (BE) versus less soft biobehavioral (BB) and nonbehavioral (NB) methods. Their results are based on non-standard analyses, with $\sqrt[4]{\left|log_{10}\left(\frac{d_{ij}}{\overline{d_j}}\right)\right|}$ as the dependent variable, where d_{ij} is the effect size (log of the odds ratio) of study *i* in meta-analysis *j*, and $\overline{d_j}$ is the summary effect size of meta-analysis *j*. After obtaining the data from Fanelli, we performed more standard meta-regression analyses on d_{ij} to verify their conclusion that effect sizes and publication bias differ between methods and US vs. other countries. For our analyses we used the R package metafor (2).

First, we ran 82 mixed-effects meta-analyses:

$$d_{ij} = \alpha^j + \beta_{US}^j US_{ij} + \beta_{SE}^j SE_{ij} + \beta_{US.SE}^j US_{ij} SE_{ij} + \varepsilon_{ij}.$$

We multiplied d_{ij} by -1 if the primary researchers expected a negative effect. $US_{ij} = 1$ if the primary study was conducted in the US, and 0 otherwise. SE_{ij} is the study's standard error, where a positive β_{SE}^jsignifies publication bias (tantamount to Egger's test (3)). Next, we ran two mixed-effects meta-meta-regressions on the 82 $\widehat{\beta_{US.SE}^J}$, both with and without method (NB, BB, or BE) as a moderator. The goal was to examine whether the regression weights from the 82 meta-analyses differed between methods, and whether they deviated from zero when averaged over the three methods.

In the meta-meta-regression, method had no effect on $\widehat{\beta_{\mathrm{US.SE}}^{\mathrm{J}}}$ $(\chi^2_{(2)} = 2.271, p = .32)$. The overall effect of $\widehat{\beta_{US.SE}^J}$ in the intercept-only model was also not significant $(-.251; z = -.765, p = .44)$, meaning that publication bias was not different for the US and other countries.

Because there was no overall $US_{ij}SE_{ij}$ interaction, we reran the 82 meta-analyses without this interaction, and then again analyzed both $\widehat{\beta_{US}^J}$ and $\widehat{\beta_{SE}^J}$ with meta-meta-regressions. Figure 1 shows the distributions of $\widehat{\beta_{US}^J}$ and $\widehat{\beta_{SE}^J}$. There was no effect of method on $\widehat{\beta_{US}^J}$ $(\chi^2_{(2)} = 3.464, p = .18)$, and no overall effect of US $(-.006; z = -.176, p = .86)$. Hence, contrary to Fanelli and Ioannidis, using standard analyses we found no evidence of higher effect sizes in the US for any of the three methods. There was also no effect of method on $\widehat{\beta_{SE}^J}$ $(\chi^2_{(2)} = 5.060, p = .08)$, but the overall positive effect of SE $(.537; z = 3.88, p < .001)$ signifies publication bias across all methods.

To conclude, we failed to find that US studies overestimate effect sizes in softer research. It is rather surprising that Fanelli and Ioannidis did find an effect of *US*, because the distribution of $\widehat{\beta_{US}^J}$ is almost centered on zero (see Figure 1, left panel). We found no effect of US and no effects of 'softness' of methods using standard analyses. However, we found overall publication bias for all methods. Hence, the conclusions of Fanelli and Ioannidis are not robust to method of analysis.

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Figure Legend

Figure 1. Histograms of the effect of US and SE on effect size.

Acknowledgments

The preparation of this article was supported by grant numbers 016-125-385 and 406-13-050 from the Netherlands Organization for Scientific Research (NWO).