

RESEARCH ARTICLE

Questionable research practices in ecology and evolution

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Data Availability Statement: All quantitative data and code will be openly available on the Open Science Framework <https://osf.io/kpqt3/>. DOI: 10.17605/OSF.IO/QX13U. Due to ethical constraints, only re-ordered qualitative information can be openly shared (in publicly available data there is no way to link these qualitative responses to any other answers given by participants). This data is sufficient to reproduce all of the results presented in this article. The full raw dataset is stored on the same OSF page but kept private. Authors will provide access for the purpose of validation and fraud detection.

Abstract

We surveyed 807 researchers (494 ecologists and 313 evolutionary biologists) about their use of Questionable Research Practices (QRPs), including cherry picking statistically significant results, *p* hacking, and hypothesising after the results are known (HARKing). We also asked them to estimate the proportion of their colleagues that use each of these QRPs. Several of the QRPs were prevalent within the ecology and evolution research community. Across the two groups, we found 64% of surveyed researchers reported they had at least once failed to report results because they were not statistically significant (cherry picking); 42% had collected more data after inspecting whether results were statistically significant (a form of *p* hacking) and 51% had reported an unexpected finding as though it had been hypothesised from the start (HARKing). Such practices have been directly implicated in the low rates of reproducible results uncovered by recent large scale replication studies in psychology and other disciplines. The rates of QRPs found in this study are comparable with the rates seen in psychology, indicating that the reproducibility problems discovered in psychology are also likely to be present in ecology and evolution.

Introduction

All forms of science communication, including traditional journal articles, involve transforming complicated, often messy data into a coherent narrative form. O'Boyle et al [1] likened the process to a Chrysalis effect, turning "ugly initial results into beautiful articles". Repeated failures to reproduce a large proportion of results in the published literature of other disciplines (e.g. [2,3]) has triggered reflection and meta-research about the ways in which this transformation process is susceptible to confusion and corruption. To date, large scale meta-research and replication projects have not been conducted in ecology and evolution [4,5]. However, many of the drivers of low reproducibility in other fields, such as publication bias and inflated type I errors, also appear common in ecology and evolution [6–9]. For example, Jennions and Møller [10] found that 38% of meta-analyses appeared to suffer publication bias, and that adjustments for missing (file drawer) studies changed the statistical conclusion (from statistically significant to non-significant) in 21% of cases. Low statistical power is a long-standing problem in ecology

Questionable Practices

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