

# Scientific reproducibility is hampered by a lack of specificity of the material resources

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A key requirement when performing scientific experiments is the accessibility of material resources, including the reagents or model organisms, needed to address a specific hypothesis. The published scientific literature is a source of this valuable information, but frequently lacks sufficient detail to the extent that researchers are unable to identify material resources used to perform experiments.

A study, published today in *PeerJ*, demonstrates the magnitude of the problem – a problem that negatively affects the ability of scientists to reproduce and extend reported studies. The study showed that a large number of scientific resources are unidentifiable based on the information reported within the [journal articles](#).

"The stories we tell in [scientific publications](#) are not necessarily instructions for [replication](#)," said Melissa Haendel, Ph.D., an ontologist and assistant professor in the Library and Department of Medical Informatics & Clinical Epidemiology at Oregon Health & Science University and senior author on the study. "This study illuminates how if we aim to use the literature as the scientific basis for reproducibility, then we have to get a lot more specific."

The study, led by Haendel and Nicole Vasilevsky, Ph.D., project manager and biocurator in Oregon Health & Science University's Ontology Development Group, examined nearly 240 articles from more than 80 journals spanning five disciplines: neuroscience, immunology, cell biology, developmental biology and general science. The articles

were evaluated to determine if the reported research resources could be uniquely identified based on the information that was provided in each article, its supplemental data, or prior references. Specific criteria were developed to determine if antibodies, cell lines, constructs, model organisms, and knockdown [reagents](#) were identifiable. Based on these criteria, Haendel, Vasilevsky and their team of researchers also developed guidelines for reporting of research resources. These guidelines are available online (<http://www.force11.org/node/4433>) and can be used as a new data standard by authors, reviewers, publishers, and other data contributors to aid reproducibility.

The study showed that just under 50 percent of scientific resources used in previously published articles were unidentifiable, a percentage which varied across resource types and disciplines. The study also found no increased level of identification in journals that had more stringent reporting guidelines.

"We hope that quantifying the problem through this study will highlight to the research community that there is a significant and pressing need to make material resource information more accessible going forward," said Vasilevsky.

**More information:** Vasilevsky et al. (2013), On the reproducibility of science: unique identification of research resources in the biomedical literature. *PeerJ* 1:e148; [DOI: 10.7717/peerj.148](https://doi.org/10.7717/peerj.148)

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