10 simple rules for socially responsible science

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Scientific research must meet clear ethical guidelines to prevent harm to participants. However, research can also indirectly harm individuals and social groups, for example by shaping social perceptions and inspiring policy. Researchers receive little to no training on how to consider and minimize such harm.

To that end, Ben-Gurion University of the Negev's Dr. Niv Reggev and his international colleagues have published ten simple rules for socially responsible science. The article was just published in *PLOS Computational Biology*.

Recently, there have been more and more calls for scientists to be held accountable for the social impact of their studies in addition to their findings. Therefore, Dr. Reggev of the Department of Psychology and School of Brain Sciences and Cognition at Ben-Gurion University, along with Dr. Alon Zivony of Birkbeck College at the University of London and the University of Sheffield, Dr. Rasha Kardosh of NYU, and Dr. Liadh Timmins of Swansea University decided it was time to brainstorm some actionable rules.

"Scientific studies impact societal norms through how they are designed, conducted, and reported. Although acknowledged for many years—perhaps the best-known example of which being a fraudulent study that triggered vaccine hesitancy—scientists interested in ensuring their outputs do not unwittingly cause societal harm often lack the tools and training to do so. In response to this lacuna, we formulated a set of ten simple rules that can help interested scientists in thinking about socially responsible science. We emphasize these rules are not meant to be prescriptive; rather, they are intended to assist in guiding and thinking

about these issues," the researchers explain.

The ten rules govern the entire lifecycle of a study, from planning to publication.

They are:

1. Get diverse perspectives early on
2. Understand the limits of your design with regard to your claims
3. Incorporate underlying social theory and historical events
4. Be transparent about your hypothesis and analyses
5. Report your results and limitations accurately and transparently
6. Choose your terminology carefully
7. Seek a rigorous review and editorial process
8. Play an active role in ensuring correct interpretations of your results
9. Address criticism from peers and the general public with respect
10. When all else fails, consider submitting a correction or a self-retraction

Get diverse perspectives early on—If you are writing about a marginalized group, consider reaching out to members of that group for "insider" information as they hold perspectives crucial to your research.

Understand the limits of your design with regard to your claims—Thinking about limitations in advance is always better than a limitations paragraph at the end of a flawed study.

Incorporate underlying social theory and historical events—Social context matters. Not including it can lead readers to the wrong conclusions about the phenomenon being studied.

Be transparent about your hypothesis and analyses—Pre-registering

the study protocols and analysis limits the risk of drawing incorrect conclusions and inspires confidence in one's conclusions.

Report your results and limitations accurately and transparently—Try not to oversimplify your results. Sometimes science is complicated. Uploading data and analysis to an online repository allows our peers to double check the data and reproduce the experiment.

Choose your terminology carefully – If you are coining a new term or discussing a particular group, make sure you aren't reinforcing stereotypes. One way to avoid this is to run it by some members of the group you are researching.

Seek a rigorous review and editorial process—Such a process is the last line of defense in keeping the scientific literature free from errors and flaws that the authors overlooked. A rigorous review process also increases the confidence of the scientific community and the general public in the results.

Play an active role in ensuring correct interpretations of your results—Work with University or journal press offices to ensure that the press release sent out is accurate and does not sensationalize the findings.

Address criticism from peers and the general public with respect—Hot button topics generate knee jerk responses as well as thoughtful criticism. Take time to review criticism and respond thoughtfully and with respect to all.

When all else fails, consider submitting a correction or a self-retraction—If subsequent criticism reveals a flaw, then a correction or a self-retraction might be in order. While a self-retraction is viewed as a 'heroic' admission of one's mistakes, journal-retractions are perceived as

a 'guilty' verdict.

"When no training exists, scientific outputs can often (unknowingly) harm society. From reinforcing social stereotypes to creating a biased AI-based tool, well-meaning scientists often generate scientific studies that unwittingly lead to detrimental societal impacts. Here we proposed a theoretical framework and a set of ten actionable rules to help scientists prevent such negative societal consequences," Dr. Reggev concludes on behalf of the team.

Provided by Ben-Gurion University of the Negev