Maintaining Trust in Science

I have compared building a body of knowledge to building an edifice, brick by brick, to convince young researchers to value and invest in high-quality foundational research. But the analogy also works well when thinking about trust in science. The foundation on which the edifice of gerontological nursing science has been built is weakened by factors that decrease the credibility of our research and published work. In this editorial, I note some of the factors that I believe threaten trust in disseminated research. I also discuss the multiple ways we might counter the threats to trust in our science.

A nasty topic for sure, but fraud in biomedical and life science research is on the rise. A detailed review in 2012 of all 2,047 biomedical and life-science research articles indexed by PubMed as retracted found that 67.4% of retractions were attributable to misconduct (Fang, Steen, & Casadevall, 2012). Fraud or suspected fraud accounted for 43.4% of articles retracted for misconduct, 14.2% involved duplicate publication, and 9.8% involved plagiarism (Fang et al., 2012). The percentage of scientific articles retracted because of fraud has increased approximately 10-fold since 1975, and these changes cannot be attributed solely to the rise in the number of research publications (Fang et al., 2012).

Multiple investigations have found that journals with a scientific impact factor retract more articles for fraud or error (Liu, 2006; Steen, 2010; Steen, Casadevall, & Fang, 2013). This finding could reflect more fraud or greater scrutiny of articles published in high-impact journals. The Center for Scientific Integrity maintains a database of retractions (access http://retractionwatch.com) and provides a permanent and easily accessible record of scientists who have published papers that contain error, misconduct, plagiarism, or duplicate publication.

Anyone with evidence of fraud should report this suspicion to a higher entity for further investigation. Readers can certainly notify editors of published findings that do not appear credible but should be prepared to provide evidence for this serious claim. These situations can be quite complex, and it is wise to know that the well-known Whistleblower Protection Act of 1989 protects only federal employees who work for the government from retaliatory action and report agency misconduct. Placing raw data in a repository that can be accessed, used, and reviewed by other scientists is required by many funders and offers some protection against intentional fraud.

Principal investigators may have high stakes riding on obtaining important findings, such as promotion, tenure, future funding, and prestige. To protect against any perception of tampering with findings, researchers with possible bias or stakes in the findings from a study should not be involved in data collection or management. Rather, unbiased and, when relevant, blinded data collectors and data managers should be charged with collecting, coding, and entering the raw data into data management systems.

The booming growth of open-access journals has lowered barriers to scientific publication. Each week, my colleagues and I receive multiple solicitation e-mails for manuscripts from these open-access journals. The arrangement by which authors become the customers of the publisher certainly creates a clear conflict of interest. The setup in which the more papers a publisher accepts, the more revenue it earns, can create a strong incentive for accepting lower quality papers. A study found that when considered as a whole, open-access journals are less selective than traditional scientific journals, with acceptance rates >50% (Association of Learned & Professional Society Publishers, 2005). In addition, only 72% of articles in open-access journals are copyedited, compared to approximately 100% in traditional journals. Most disturbing, internal editorial staff provide peer review for approximately 28% of papers.
in open-access journals (Association of Learned & Professional Society Publishers, 2005). Although many open-access publications have high standards of ethics and peer review, the long-term effects of open access on the quality of science and trust in science are worthy of scrutiny.

Tenure criteria that value the quantity of publication dissemination output over quality can foster bad research and lower quality articles. Like most high-quality journals, Research in Gerontological Nursing routinely uses software to check for duplications in text of submitted papers with published papers and checks for “salami slicing.” Salami slicing is a term often used to describe the practice of dividing a large study into multiple articles that report different findings from the same study. This practice is generally regarded as diminishing the value of each publication to increase the number of publications that can be listed in a curriculum vitae. There are certainly instances in which it is legitimate and justifiable to produce multiple publications based on the same study. RGN editorial staff check for other publications from the same study and ask authors to inform our offices about any possible overlapping information when submitting a paper.

To maintain trust in our science, we need high-quality peer review and standards for the quality of research being reported. At RGN, we are proud of our broad array of highly trained peer reviewers and greatly appreciate the time and attention they give to peer review. As our science grows and becomes more technological and analytical methods become more complex, we increasingly need statistical and technological reviewers.

Academic institutions and private companies are increasingly working together on research and commercial activities. Relationships with pharmaceutical and biotechnology companies offer opportunities for research funding, advances in health care, prestige, and revenue generation for universities and scientists. These partnerships also raise the potential for conflict of interest and damage to trust in science. A review of 398 studies published in The New England Journal of Medicine and JAMA found that 38.7% of drug treatment studies had authors with a conflict of interest (Friedman & Richter, 2004). More concerning was a strong association between conflicts of interest and the report of positive findings among all intervention studies (p < 0.001) (Friedman & Richter, 2004). Disclosure of potential conflicts is now mandated by journals and is consistent with leading ethical guidelines, such as the Committee on Publication Ethics (COPE; 2011) code of conduct for journal editors and the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals (International Committee of Medical Journal Editors, 2017). Editors and the scientific community need to value high-quality studies that yield negative findings and create incentives for the reporting of negative findings by those who have a financial conflict of interest in the outcome of such studies.

Journalists and celebrity health care professionals may help promote science but may also erode trust in science. These intermediaries often provide medical advice. They may report results of a single methodologically weak study as a medical breakthrough or use a small number of correlational studies as the basis for claims of effectiveness of a health product or recommended lifestyle change. A systematic review of the advice given by Dr. Mehmet Oz, the well-known television personality, found that approximately one half of his advice conflicts with scientific literature (Korownyk et al., 2014). Challenging misinformation and writing editorials and articles for lay audiences that educate the public on misleading reports may help correct and invalidate some flawed reporting of recommendations from research.

Many ways to counter threats to the trust in our science come from self-monitoring and self-regulation within scientific and publishing communities. We need to evaluate the incentive system of science and how the rewards to researchers who publish many research papers can impact the quality of our science and trust in the reporting of science. To return to the analogy of gerontological nursing science as an edifice we are building brick by brick, I hope that this editorial will prompt discussions among gerontological scientists about ways to maintain and strengthen trust in our science—an important foundation of our work and ability to make progress in research.

REFERENCES


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