

Flawed research not retracted fast enough to prevent spread of misinformation, study finds

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Retracting academic papers does not dampen the reach of problematic research in online platforms as intended.

Instead, research that is later retracted is often widely circulated online, both by news outlets and [social media](#), and the cycle of [attention](#) that it receives typically dies away before the [retraction](#) even happens, according to research by the University of Michigan and Northwestern University.

The study, published in the *Proceedings of the National Academy of Sciences*, has concerning implications for the spread of misinformation and public trust in science.

Retracted papers included in the analysis, however, were often the subject of more critical discourse on Twitter before their retraction, suggesting that while Twitter should not be an official judge of science, with appropriate caveats, it's possible that it could provide early signals of dubious research, the researchers say.

Retracted papers receive more attention than comparable nonretracted papers even before retraction. One possible reason is that retracted papers may contain sensational or novel findings, which could lead to increased attention, they say.

"If people make mistakes randomly, it could make the results look either more novel or less novel. However, novel results are more likely to be published in the peer-reviewed literature. Thus, papers that are later retracted would end up getting extra attention partly because their results tend to be 'flashy,'" said Hao Peng, a doctoral graduate of the U-M School of Information who is now a postdoctoral fellow at Northwestern.

When a paper is retracted, the goal is to officially discredit the findings and acknowledge the research as flawed, thereby maintaining the overall integrity of research. But many people who hear about the initial finding may never learn of the retraction.

To better understand the cycle of attention in retracted papers, Peng and colleagues combed through social media and news media databases to track mentions of the paper. Using Retraction Watch and Altmetric data databases, the team compared the online footprints of 2,830 retracted papers to 13,599 nonretracted control papers that had similar publication venues, dates, numbers of authors and authors' citation counts. The researchers compared the amount of attention between the two groups of papers, both six months after publication and again post-retraction.

Realizing that not all tweets are sharing the papers in a positive way, the team carefully labeled thousands of tweets about research—both manually and with the help of algorithms.

"Deciding whether a tweet that shares a [research paper](#) is being critical or uncritical is actually a hard problem using only machine learning because the paper's finding and sometimes its title can itself contain uncertain words," Peng said.

To work around this problem, the researchers augmented the algorithmic labeling with manual labeling done by trained humans.

The tweets were categorized as either critical (containing questioning words, skepticism, disapproval, etc.) or uncritical (sharing findings, remarking in a positive way, etc.). The average fraction of critical tweets was more than twice as high for papers that were later retracted as it was for unretracted papers, suggesting that people recognized consistently that something was wrong with the way those studies were conducted.

The team found that retracted papers tended to have significantly higher numbers of initial mentions on forums like major social media platforms, online news sites, blogs and knowledge repositories like Wikipedia compared to papers that were never retracted.

"Social media and even top news outlets—the most prestigious venues that cover science—are more prone to talk about papers that end up being retracted," said study co-author Ágnes Horvát, assistant professor of communication at Northwestern.

When retractions occurred, the process drove a small bump in attention related to the retraction, but it was much smaller than the amount of attention that the papers had previously received, suggesting that many people who were aware of the initial findings never heard about the retraction. Indeed, Peng notes that retracted papers often continue to be cited by other scientists, even after their retraction.

"One of the main takeaways is that retractions come too late," said study co-author Daniel Romero, associate professor at the U-M School of Information. "Retractions remain important, but they're not serving the purpose of reducing the amount of attention that we pay to these problematic papers because, by the time they come, the public is no longer paying much attention to the original paper."

Sparking debate on Twitter: Can this be a warning of future retractions?

Through their labeling process, the researchers also found that discourse about retracted papers tended to be more critical overall on Twitter. Their findings suggest that Twitter might provide a valuable signal—a kind of "wisdom of the crowd"—that can potentially identify when research is problematic.

The researchers are quick to add that Twitter is not an arbiter of good science.

"This is not to suggest that we should investigate everything that's

flagged on Twitter as potentially a bad paper," Horvát said. "Social media was not designed to have productive conversations about the quality of scientific papers."

She notes that while social media can provide a useful signal, specialized institutions need to evaluate and manage retractions.

However, the team's findings suggest that people who consume science on social media do not do so passively. Spirited discussions and reevaluations of research is important for the progression of science.

"We should always keep in mind that once new data, new scientific findings, or retractions come in, we need to be ready to update our knowledge and beliefs," Romero said.

The researchers note that retractions should remain rare, and when they happen, it should be the result of a careful investigation and consensus that something problematic occurred.

More information: Hao Peng et al, Dynamics of cross-platform attention to retracted papers, *Proceedings of the National Academy of Sciences* (2022). [DOI: 10.1073/pnas.2119086119](https://doi.org/10.1073/pnas.2119086119)

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