

## SOCIOLOGY

# Scientific Misconduct: Do the Punishments Fit the Crime?

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It is commonly accepted that punishments meted out for scientific misconduct (falsification, fabrication, or plagiarism) (1) effectively end one's career, banishing the bad apple for violating the trust that the scientific community confers on its members (2, 3). Yet, little is known about the consequences of being found guilty of misconduct. Are punishments as severe as many suspect?

We identified from public records all investigators holding terminal degrees found guilty of misconduct by the U.S. Office of Research Integrity (ORI) between January 1994 and December 2001, inclusive. In late 2003, we examined their cases, searched for publications before and after the ORI decision, and attempted to locate these people to see if the findings had caused career changes and to interview them (4).

In this 8-year period, ORI found that 106 individuals had committed misconduct. Of these, 43 held terminal degrees (31 Ph.D., 8 M.D., 4 M.D./Ph.D.) and were employed in a professional, faculty, or research scientist role; we omitted students and fellows, limiting our study to those who had established research careers. All but one individual worked in nonprofit research settings. Thirty-six of these scientists were found guilty of falsification or fabrication, 10 were guilty of plagiarism, and 12 were guilty of "misrepresentation." Seventeen scientists had committed only one infraction, and the remaining 26 had committed multiple breaches.

All 43 individuals were excluded from Public Health Service (PHS) advisory boards (for a mean 3.5 years), 30 were also debarred from PHS grants and contracts (mean 3.4 years), 20 were subjected to institutional oversight (mean 3.2 years), and 14 were required to retract or correct papers. Overall, these scientists received an average of 2.5 sanctions; of 94 total sanctions levied, 58% were 3-year debarments.

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There were few differences in number or duration of sanctions between those who committed fabrication and/or falsification, plagiarism, or misrepresentation. The only systematic differences observed were (i) retraction was never required after plagiarism and (ii) those who had falsified and/or fabricated data were 8.8 times ( $z = 2.34$ ,  $P = 0.019$ ) more likely than others to receive grant debarments and received on average 0.6 more sanctions.

Searching PubMed, we found publication data for 37 of the 43 individuals. Papers were examined to ensure correct authorship. Mean publication rate per year before the finding of scientific misconduct (dating back to each individual's first publication) was 2.1 (SD = 1.7, range 0.2 to 5.9) and after the finding 1.0 (SD = 1.2, range 0.0 to 5.6) (dating up to late 2003). This decline was significant ( $t = 4.66$ ,  $P < 0.0001$ ). Twelve individuals published nothing after the misconduct finding.

From publications and other public sources, we located 28 of 43 scientists. As anticipated, many had changed jobs. Twenty-three of these 28 traceable scientists worked at universities at the time of their misconduct finding, and 10 of these were still in academia at the time of the study. Eight individuals moved to industry from university or other nonprofit positions, all of whom had been found guilty of falsification or fabrication but not plagiarism or misrepresentation.

We successfully contacted 22 of the 28 scientists by phone or e-mail. Three people did not follow up with us, and 12 expressly refused; several who refused told us they simply wished to put it behind them.

Interviews were held with seven individuals, who all reported financial and personal hardship. Six hired lawyers to defend themselves; surprisingly, three reported receiving some assistance from their institutions, one with legal help and two with nonfinancial support. Several reported that they could not appeal their cases because they lacked the resources to do so. Several became physically ill and experienced major disruptions in their personal lives.

Nonetheless, most reported that they had recovered or sustained useful scientific lives after initial shocks to their reputations.

What happens to researchers after a finding of misconduct?

Indeed, six of the seven continued to publish in the years after the ORI determination (the exception had moved to industry). Our interviewees were more productive than the other scientists, publishing on average 1.3 more papers per year after their cases were decided ( $t = 2.77$ ,  $P = 0.0045$ ), and they were less likely to have been excluded from federal grants and contracts (Fisher's exact test,  $P = 0.019$ ). Thus, the picture of the consequences painted by our interviews, which shows both the hardship of punishment and the chance for redemption, is perhaps more positive than it should be.

We found that 43% of academic scientists whom we could trace remained employed in academia after being found guilty of misconduct, and overall 19 of 37 scientists (51%) found to have committed misconduct continued to publish at least an average of one paper per year after their cases were decided. Overall, the punishments we observed were related to the crimes: Acts of falsification and fabrication were punished more harshly than were acts of plagiarism.

Of course, we have only studied those found guilty of misconduct by ORI, which is the tip of the iceberg. In the shadow of the official misconduct apparatus, there are informal means for sanctioning poor conduct that never see light beyond the bounds of the laboratory, the department, the institution, or the discipline (5). Whether sanctions meted out across the scientific establishment are reasonable and fairly applied requires further study.

## References and Notes

- 42 Code of Federal Regulation §50.102 (2004).
- P. Woolf, *Hastings Center Rep.* 11(5), 9 (1981).
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- This study was approved by the Institutional Review Boards at Wayne State University and the University of Pennsylvania. Informed consent was obtained verbally during phone interviews.
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