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Research Misconduct Definitions Adopted by U.S. Research Institutions:

Introduction

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Abstract

In 2000, the US federal government adopted a uniform definition of research misconduct as fabrication, falsification, or plagiarism (FFP), which became effective in 2001. Institutions must apply this definition of misconduct to federally-funded research to receive funding. While institutions are free to adopt definitions of misconduct that go beyond the federal standard, it is not known how many do. We analyzed misconduct policies from 183 US research institutions and coded them according to thirteen different types of behavior mentioned in the misconduct definition. We also obtained data on the institution's total research funding and public vs. private status, and the year it adopted the definition. We found that more than half (59%) of the institutions in our sample had misconduct policies that went beyond the federal standard. Other than FFP, the most common behaviors included in definitions were "other serious deviations" (45.4%), "significant or material violations of regulations" (23.0%), "misuse of confidential information" (15.8%), "misconduct related to misconduct" (14.8%), "unethical authorship other than plagiarism" (14.2%), "other deception involving data manipulation" (13.1%), and "misappropriation of property/theft" (10.4%). Significantly more definitions adopted in 2001 or later went beyond the federal standard than those adopted before 2001 (73.2% vs. 26.8%), and significantly more definitions adopted by institutions in the lower quartile of total research funding went beyond the federal standard than those adopted by institutions in the upper quartiles. Public vs. private status was not significantly associated with going beyond the federal standard.

Keywords

research misconduct; policies; definitions; ethics; integrity

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Misconduct is a serious problem that undermines the integrity of research and public support for science. Although the incidence of research misconduct is thought to be low, it can have wide-ranging adverse impacts on universities, faculty, students, and the scientific community when it occurs (Martinson et al 2005, Fanelli 2009, Shamoo and Resnik 2009). One important policy issue concerning research misconduct is how to define it (Steneck 1999, Resnik 2003). After more than a decade of debate, on December 6, 2000, the US federal government announced a uniform definition of research misconduct that applies to all agencies supporting intramural or extramural research (Office of Science and Technology Policy 2000). Agencies were given one year to implement the policy. The federal definition of misconduct is “fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results... (Office of Science and Technology Policy 2000, 76262).” This definition focuses on only three types of unethical behavior: fabrication, falsification, and plagiarism (FFP). Earlier definitions used by the Public Health Service, which funds National Institutes of Health (NIH) research, and the National Science Foundation had included FFP as well as other serious deviations from accepted practices (Steneck 1999). The federal government decided to eliminate the other serious deviations category from the misconduct definition on the grounds that it was inherently vague and therefore difficult to enforce (Resnik 2003).

Institutions must apply the federal definition of misconduct to federally-funded research to receive funding. While institutions are free to adopt definitions of misconduct that go beyond the federal standard, it is not known how many do. Anecdotal evidence suggests that there may be considerable variation in the misconduct policies adopted by US research institutions, but there has been little systematic research on this topic (Steneck 1994). Lind (2005) conducted a pilot study of the misconduct policies of the top 25 US research universities, but the study only examined the accessibility and usefulness of the policies; it did not describe variation in the definition of misconduct. The aims of our study were to: (1) describe variation in the misconduct definitions adopted by US research institutions; (2) determine the percentage of institutions with definitions that go beyond the federal standard; and (3) determine whether going beyond the federal standard is associated with a) research funding, b) public vs. private status, or c) effective date of the definition.

Methods

We attempted to access research misconduct policies from the public websites of the top 200 funded US research institutions according to the most recent data available (2009) from the Center for Measuring University Performance (Center for Measuring University Performance 2009). We eliminated the University of California System Central Administration from the list because it does not conduct research, and we eliminated the University of Maryland Biotechnology Institute because it has been reorganized. This left us with 198 institutions. If we could not access misconduct policies on public websites, we contacted a research integrity official at the institution by email and asked for a copy of the policy. We sent reminder emails if we did not receive a response. In a few cases, we contacted institutions by phone to obtain a policy or additional information. We included policies that addressed research misconduct, scientific misconduct, scholarly misconduct, or

similar concepts. We did not include policies that focused exclusively on academic or student misconduct.

We developed a classification system for categorizing research misconduct definitions based on an initial review of the policies we obtained and a survey of the misconduct literature. We classified policies according to whether they treated thirteen different types of behavior as misconduct. We also included the “other” category for behaviors that did not fall into these categories (see Box 1). Definitions that included FFP were classified as meeting the federal standard; definitions that included FFP and other behaviors were classified as going beyond the federal standard. To ensure consistency, two of us (AR and TN) independently coded the definitions. We assessed inter-rater agreement for categorizing institutions as meeting or going beyond the federal standard using the percent agreement and a kappa statistic, with its z-statistic and 95% confidence interval. We reconciled differences in coding by a conference with the study team. We also collected data on total funding amount, public vs. private status, and year of the last significant revision of the misconduct policy. We considered a revision to be significant if it was more than editorial and addressed the content of the policy.

Box 1

Types of behavior defined as research misconduct

1. Fabrication of data
2. Falsification of data
3. Plagiarism
4. Other serious deviations from accepted practices
5. Other deception involving manipulation of data or experiments.
6. Misconduct related to misconduct: retaliation for good faith misconduct allegations, interfering with a misconduct investigation, covering up misconduct, failing to report misconduct one knows about, or making inappropriate (i.e. knowingly false and malicious) misconduct allegations
7. Misuse of confidential information obtained in peer review or elsewhere
8. Significant or material violations of regulations, laws, or policies pertaining to human subjects, animal research, biosafety (recombinant DNA), radiation safety, or other areas of research.
9. Misappropriation of funds
10. Misappropriation of property/destruction/theft
11. Unethical authorship practices other than plagiarism
12. Misrepresentation of one's credentials/qualifications
13. Failure to disclose significant financial interests

14. Other

We excluded one institution from the statistical analysis because it did not meet the federal standard. All of the remaining institutions either met or exceeded the federal standard. We compared the categories “Meets the federal standard, but does not go beyond” and “Meets and goes beyond the federal standard” with respect to total research funding using Mann-Whitney tests. Using chi-square tests, we also compared these two categories of institutions with respect to public vs. private status, time at which the policy was last updated (pre 2001 vs. 2001 or after), and quartile of total research funding. Chi-square tests were also used to test associations among meets/goes beyond federal standard, time of last policy update, and public vs. private status. We divided time of last policy update into the categories “before 2001” and “2001 or after” because federal agencies implemented the new, federal misconduct definition in 2001. For institutions that went beyond the federal standard, chi-square tests (or Fisher’s exact test, if expected frequencies were small) were used to test the associations between time of last policy update and presence of each of the additional behaviors mentioned in the definition (other than FFP). All p-values were two-sided and considered statistically significant if less than 0.05. SAS 9.2 (2008, SAS Institute, Cary NC) statistical software was used for data analysis.

The NIH’s Office of Human Subjects Research Protections determined that the federal research regulations do not apply to our study, because we were not collecting private information about individuals.

Results

We were able to obtain 184 policies from 198 institutions (92.9%). Our analysis focused on the 183 institutions (99.5%) with definitions that met the federal standard. Of these, 138 were public (75.5%) and 45 were private (24.5%). Mean total research funding ($\times \$1000$) was $(\$271,443 \pm 250,905)$. The last significant policy update was: before 2001, 26 (14.2%); 2001 or after, 141 (77.1%); missing data, 16 (8.7%). 108 institutions (59%) met the federal standard and went beyond it; 75 (41%) met the federal standard but did not go beyond it. 179 policies (97.8%) came from websites and 4 (2.2%) came from emails (See Table 1). Table 2 lists the different categories of behavior defined as misconduct by the 183 institutions that met the federal standard. For the categorizing policies are meeting the federal standard vs. going beyond it, inter-rater agreement was 170/183 (93%). The kappa statistic was 0.853 (95% confidence interval = 0.776, 0.930). There was significant inter-rater agreement ($z = 21.8$, $p < 0.001$).

We found a significant association between going beyond the federal standard and time of last policy update. 71 institutions (73.2%) with the last significant policy update in 2001 or after exceeded the federal standard for defining misconduct, as compared to 26 (26.8%) for before 2001 ($p < 0.001$, missing data excluded). We also found a significant association between going beyond the federal standard and total research funding. 35/45 (77.8%) institutions in the first (lowest) funding quartile had a definition that exceeded the federal standard, as compared to 28/46 (60.8%) in the second quartile, 22/46 (47.8%) in the third, and 23/46 (50%) in the fourth ($p = 0.0145$). We did not find any significant association

between going beyond the federal standard and public vs. private status. 26/45 (57.8%) of private institutions went beyond the federal standard, as compared to 82/138 (59.4%) of public institutions ($p = 0.85$). See Table 3.

Discussion

The most important finding of our study is that more than half (59%) of the institutions in our sample had misconduct policies that went beyond the federal standard (FFP). The most common behaviors included in definitions were “other serious deviations” (45.4%), followed by “significant or material violations of regulations” (23.0%), “misuse of confidential information” (15.8%), “misconduct related to misconduct” (14.8%), “unethical authorship other than plagiarism” (14.2%), “other deception involving data manipulation” (13.1%), “misappropriation of property/theft” (10.4%), “misappropriation of funds” (6.6%), “misrepresentation of one’s credentials” (4.9%), “failure to disclose significant financial interests” (1.6%), and “other” (6.0%). A possible explanation for the fact that more than half of the institutions are going beyond the federal standard is that they need to deal with misconduct in research in addition to FFP. Research suggests that scientists are engaging in ethically problematic behaviors other than FFP that may concern institutional officials (Martinson et al 2005). As noted previously, the category “other serious deviations” was dropped from federal misconduct definitions in 2001, when agencies adopted the uniform standard (FFP). When this revision occurred, some researchers objected that the new definition was too narrow and did not provide sufficient oversight of research integrity (Resnik 2003).

A second important finding of our study is that there is considerable variation in the misconduct policies of the institutions we examined. Seven types of behaviors other than FFP were included in at least 10% of the definitions we examined. The implications of this variation for research integrity are unclear. On the one hand, one could argue that variation helps to promote integrity, because it enables institutions to address concerns that they regard as particularly relevant to their institutional culture and research focus. On the other hand, one could argue that variation in definitions undermines research integrity because it is potentially confusing to collaborators from different institutions. If scientists from different institutions are governed by different definitions of misconduct, they may find it difficult to know whether to report a suspected violation related to their collaborative project because they may be unsure about which institution’s rules apply. Additional research could help address the question of whether variations in misconduct policies impact research integrity and oversight.

A third important finding of our study is that significantly more definitions adopted by institutions in 2001 or later went beyond the federal standard than those adopted before 2001 (73.2% vs. 26.8%). We are somewhat surprised by this finding, since the federal definition was reduced to FFP in 2001, and one would expect that institutions that revised their definitions in 2001 or after would conform to the federal standard. A possible reason why more definitions adopted in 2001 or after go beyond the federal standard is that institutions have become more aware of the importance of promoting research integrity since 2001, as a result of highly publicized cases of misconduct and government efforts to foster responsible

conduct of research. However, this hypothesis is speculation on our part, and more research is needed to address this issue.

A fourth important finding is that significantly more institutions in the first (lowest) quartile of total research funding had definitions of research misconduct that exceeded the federal standard, as compared to the second, third, and fourth quartiles. We are somewhat puzzled by this finding because one would expect that the top-funded institutions would be more likely to have definitions that go beyond the federal standard, since they have more research funding at stake than institutions that receive less money for research. Additional research is needed to address the relationship between research funding and institutional misconduct definitions.

Our study has several limitations. First, our sample size (183) is somewhat small. With a larger sample size we might have detected statistical associations not observed here. However, we believe that our sample is large enough to provide an overview of the misconduct policies adopted by US research institutions. Second, we had some missing data for the year of last policy revision because some of the websites we visited did not include an effective date for the misconduct policy. We contacted institutions to try to obtain this information, and in many cases they responded, but not all of them did. While we acknowledge that our study would have been more complete if we had been able to obtain this data, we have no evidence that the missing data affected our overall results. Third, we did not attempt to investigate institutional rationales for adopting research misconduct definitions or the impact of those definitions on research integrity and oversight. Additional research, such as interviews with institutional officials and researchers, could provide some insight into these issues, and we encourage others to address these questions.

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References

- Center for Measuring University Performance. [Accessed: May 30, 2013] Top 200 Institutions, Total Funding 2009. 2009. Available at: http://mup.asu.edu/Top200-III/2011_top200_totres.xls
- Fanelli D. How many scientists fabricate and falsify research? A systematic review and meta-analysis of survey data. *PLoS One*. 2009; 4(5):e5738. [PubMed: 19478950]
- Lind RA. Evaluating research misconduct policies at major research universities: a pilot study. *Accountability in Research*. 2005; 12(3):241–262. [PubMed: 16634174]
- Martinson BC, Anderson MS, de Vries R. Scientists behaving badly. *Nature*. 2005; 435(7043):737–738. [PubMed: 15944677]
- Office of Science and Technology Policy. Federal Research Misconduct Policy. *Federal Register*. 2000 Dec 6; 65(235):76260–76264.
- Resnik DB. From Baltimore to Bell Labs: reflections on two decades of debate about scientific misconduct. *Accountability in Research*. 2003; 10(2):123–135. [PubMed: 14577424]
- Shamoo, AE.; Resnik, DB. *Responsible Conduct of Research*. 2. New York: Oxford University Press; 2009.

- Steneck NH. Research universities and scientific misconduct—history, policies, and the future. *Science and Engineering Ethics*. 1999; 5(2):161–176. [PubMed: 11657853]
- Steneck NH. Confronting misconduct in science in the 1980s and 1990s: what has and has not been accomplished? *Journal of Higher Education*. 1994; 65(3):310–330. [PubMed: 11653367]

Table 1

Summary statistics

Policy obtained from website	179/183 (97.8%)
Policy obtained from email	4/183 (2.2%)
Private	45/183 (24.5%)
Public	138/183 (75.5%)
Total research funding × 1000	271,443 ± 250,905
Last policy update before 2001	26/183 (14.2%)
Last policy update 2001 or after	141/183 (77.1%)
Missing date for year of update	16/183 (8.7%)
Institutions that met the federal standard but did not go beyond	75/183 (41%)
Institutions that went beyond the federal standard	108/183 (59%)

Table 2

Types of behavior included in research misconduct definitions

Fabrication	183/183 (100.0%)
Falsification	183/183 (100.0%)
Plagiarism	183/183 (100.0%)
Other serious deviations	83/183 (45.4%)
Significant or material violations of regulations	42/183 (23.0%)
Misuse of confidential information	29/183 (15.8%)
Misconduct related to misconduct	27/183 (14.8%)
Unethical authorship other than plagiarism	26/183 (14.2%)
Other deception involving data manipulation	24/183 (13.1%)
Misappropriation of property/theft	19/183 (10.4%)
Misappropriation of funds	12/183 (6.6%)
Misrepresentation of one's credentials	9/183 (4.9%)
Failure to disclose significant financial interests	3/183 (1.6%)
Other	11/183 (6.0%)

Table 3

Going beyond the federal definition of misconduct

* Last policy update before 2001	26/97 (26.8%)	p <0.001
Last policy update 2001 or after	71/97 (73.2%)	
First (lowest) total research funding quartile	35/45 (77.8%)	p = 0.0145
Second quartile	28/46 (60.8%)	
Third quartile	22/46 (47.8%)	
Fourth quartile	23/46 (50%)	
Private	26/45 (57.8%)	p = 0.85
Public	82/138 (59.4%)	

* Missing data excluded