



## Research Misconduct (RCR-Basic)

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### Introduction

Please review one of the videos below before you begin reading the module. Each video is approximately three minutes long.



video case study



video case study with a  
biomedical focus

The purpose of this module is to provide an overview of research misconduct and other behaviors that can compromise research integrity. Although this module provides a general overview about research misconduct, individuals should refer to their organization's policies or other relevant resources for specific guidance about the topic. Organizations have detailed rules and procedures relating to research misconduct, including about how to handle a misconduct allegation. The information presented here is not intended to provide legal advice, replace legal counsel, or substitute for consulting with experts who manage research misconduct allegations.

### Learning Objectives

By the end of this module, you should be able to:

- State how the U.S. federal government has defined research misconduct.
- Differentiate among the three types of research misconduct: fabrication, falsification, and plagiarism.
- Identify factors that can contribute to the occurrence of research misconduct.
- Describe strategies that individuals and organizations might use to prevent or mitigate the occurrence of research misconduct.
- Describe how research misconduct allegations should be managed.

### Defining Research Misconduct

In December 2000, the U.S. Office of Science and Technology Policy (OSTP) proposed a research misconduct policy, which was subsequently adopted by ten federal agencies. The Policy defines research misconduct as fabrication, falsification, and plagiarism, which are often collectively referred to as **FFP**.

According to OSTP, "research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results."

OSTP states that "The research record is the record of data or results that embody the facts resulting from scientific inquiry, and includes, but is not limited to, research proposals, laboratory records, both physical and electronic, progress reports, abstracts, theses, oral presentations, internal reports, and journal articles."

It is important to note that "Research misconduct does not include honest error or differences of opinion" (OSTP 2000). To be considered research misconduct, the behavior must have been performed "intentionally, knowingly, or recklessly."



#### Fabrication

"Fabrication is making up data or results and recording or reporting them" (OSTP 2000). Fabrication often involves creating fake data to fit a hypothesis. Fabrication could include creating fictional tables, graphs, or figures that are placed in manuscripts, grant applications, or poster presentations.

Unfortunately, fabricated data have contaminated the research literature in many fields, including in physics with Jan Hendrik Schön (Reich 2009) and in psychology with Diederik Stapel (Enserink 2012). Schön was employed by Bell Labs, but he was dismissed after an internal committee found that he had committed numerous instances of research misconduct, including fabricating entire data sets. Stapel was a social psychologist and his misconduct included "the manipulation of data and complete fabrication of entire experiments" (Verfaellie and McGwin 2011).

#### Falsification

"Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record" (OSTP 2000). Falsification includes inappropriately manipulating existing results to fit a preferred hypothesis or altering data to make them appear more convincing than they actually are. Falsification can take many forms. For example, it can occur in figures, graphs, and digital images.

For example, the animal researcher, Li Chen, was found guilty of falsifying and fabricating data reported in publications and in National Institutes of Health (NIH) grant applications. Chen also falsified figures by reusing and relabeling an image and claiming that it represented different experiments, and falsely reported that the identical image represented several different experimental treatments (ORI 2014).

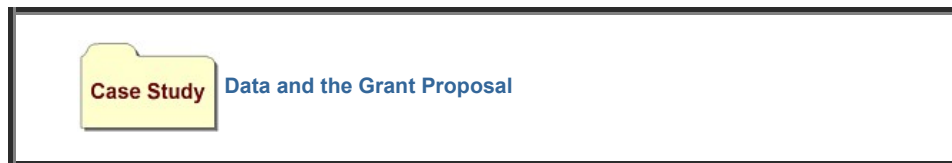
### Plagiarism

"Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit" (OSTP 2000). Plagiarism can appear in a journal article, a conference paper, or many other venues; it occurs when someone else's words or ideas are used, such as in a results or discussion section, without giving proper credit or attribution to the original author.

For example, Carleen Basler resigned from the Anthropology and Sociology Department at Amherst College after admitting that her written work contained plagiarized content (Reyes 2012). Basler's papers contained numerous instances of unattributed verbatim quotations. She did not properly reference the work of other scholars.

For more information, refer to the CITI module on "Plagiarism".

## The Prevalence of Research Misconduct



It is difficult to quantify how often misconduct occurs. One method for approximating its frequency is referring to cases examined by federal agencies. In 2014, the U.S. Department of Health and Human Services (DHHS) Office of Research of Integrity (ORI) **found 13 researchers guilty of research misconduct**; it found 10 researchers guilty in 2013. The federal ORI examines research misconduct cases relating to research funded by the U.S. Public Health Service (PHS).

The National Science Foundation (NSF) has also provided statistics about the prevalence of misconduct. According to the NSF's Office of Inspector General (OIG), "our investigations have resulted in 120 findings of research misconduct, more than 80 percent of which found plagiarism" between the time period of 2003 to early 2013 (NSF 2013).

A growing number of scholars are seeking to quantify how often misconduct occurs. For example, Fanelli (2009) estimates that nearly 2% of researchers have admitted to falsifying or fabricating data at least once. According to Fanelli, nearly 34% reported engaging in other forms of questionable research practices and 14% reported having witnessed colleagues manipulating or making up data.

There is also a notable increase in retractions of scientific papers based on fraud or suspected fraud (Fang 2012). Falsification and fabrication are more commonly mentioned as the reasons for a paper retraction than plagiarism.

## Why Research Misconduct Occurs

### Individual Factors

There are a variety of reasons why an individual might engage in research misconduct. Stress and personality traits, such as arrogance or indifference, can be key contributing factors. Self-deception or rationalization of certain behaviors may also influence one's willingness to engage in research misconduct. For example, if researchers convince themselves that a preferred hypothesis is correct and do not collect enough data to support that hypothesis, they may find themselves heading down a path towards research misconduct.

Individuals at any career stage may be tempted to engage in research misconduct. For example, a student might feel pressure to get good grades or complete a project on time. A faculty member may feel pressure to publish data and obtain grant funding in order to secure a promotion or tenure. A postdoctoral researcher might engage in research misconduct to obtain results quickly in order to move on to the next career stage. Alternatively, a researcher might pressure a collaborator into committing an act of misconduct.

### Organizational Factors

An organization's stance on the importance of research integrity sets the tone for its students and employees to follow. Conversely, the lack of an ethical climate within an organization can have corrosive effects. If individuals are not held accountable for bad behavior and rules are not enforced, research misconduct can become pervasive within an organization. Moreover, research misconduct is often connected to poor or inadequate mentoring (Anderson et al. 2007). For example, when a senior researcher does not spend enough time reviewing trainees' data or teaching them appropriate research methods, the occurrence of problematic behaviors is more likely.



### Related Factors

The availability of certain kinds of technology, such as the Internet for acquiring information for writing assignments or software tools to alter digital images, can make research misconduct more common. Unfortunately, the ease with which researchers and others can copy text or manipulate data can create an opportunity to engage in research misconduct.

## Other Problematic Research Behaviors

### Questionable Research Practices

Behaviors that closely border on research misconduct but do not fall under its strict definition are often referred to as **questionable research practices** (QRPs) (NRC 1992). Examples of QRPs include failing to disclose negative outcomes or stopping research

prematurely if a preferred outcome seems to have been achieved. Other examples of QRPs include inappropriate research design and using a flawed statistical analysis to support a hypothesis. Other behaviors that affect research integrity include ignoring or circumventing organizational policies and not properly disclosing conflicts of interest (Martinson et al. 2005).

#### Noncompliance

In this context, noncompliance typically refers to conducting research in a manner that disregards or violates federal regulations or organizational policies. Noncompliance often involves the failure to adhere to appropriate human or animal subjects research practices. Noncompliance can be intertwined with research misconduct if, for example, it leads to the presentation of falsified or fabricated data.

#### Sexual Harassment

Sexual harassment is sometimes a dimension of a research misconduct allegation. For example, someone might be pressured to engage in research misconduct based on sexual harassment. While sexual harassment is unethical and illegal, it is not typically managed under research misconduct policies. Rather, a separate organizational policy usually addresses the matter.

#### Authorship Disputes

Disagreements about authorship should be referred to the appropriate entities within the organization, such as a research director, or external entities, such as a journal editor. Although authorship disputes can certainly become ethically problematic, they are not included as part of the definition of research misconduct unless FFP is involved.

### The Effects of Research Misconduct

#### On Society

Society contributes to the advancement of knowledge through public funding of research. When any researcher or research community engages in misconduct or allows it to occur, the public trust is betrayed and its funds squandered. Moreover, valuable resources and time are wasted when other researchers attempt to build on or replicate erroneous research. Society as a whole suffers when researchers conduct fake, deceptive, or otherwise unethical research.



What makes this problem more serious is that identifying and determining the impact of a research misconduct case can sometimes take years. For example, if data relating to the side effects of a medication have been manipulated, the public may think or be told the medication is safer than it actually is. Steen (2011) examined about 200 papers in the area of medical research and clinical trials that were retracted due to questionable data; he comments that these retracted papers may have affected the medical care of thousands of patients. Along similar lines, research published by anesthesiologist Scott Reuben altered the way physicians provide pain relief to patients undergoing orthopedic surgery; however, much of his work contained partially or completely fabricated data. An investigation revealed that at least 21 of Reuben's papers were pure fiction (Borrell 2009).

#### On Researchers and Their Organizations

The expense to an organization of handling a research misconduct case is significant. Michalek et al. (2010) estimate that the direct costs from a full scale research misconduct investigation, meaning that all of the main phases take place, is well over \$500,000. Their estimate takes into account personnel salaries, consultant fees, materials, and loss of potential grants.

Moreover, funds from sponsors may need to be re-paid if a research misconduct allegation is verified. Loss of research and general organizational productivity can be significant as the process of resolving a lengthy research misconduct case can involve many individuals and is labor intensive.

Research misconduct can significantly damage an organization's reputation. A tarnished organization could have difficulty attracting potential sponsors and recruiting faculty and students. An individual researcher's credibility, work, and future employability will also be negatively affected if research misconduct is substantiated.

### Strategies for Preventing or Mitigating Research Misconduct

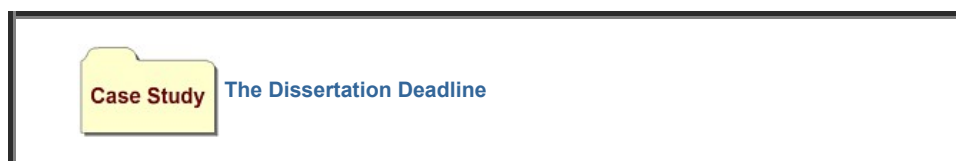
Over the last two decades, the federal ORI, organizations, and other entities have developed numerous responsible conduct of research (RCR) education and training programs that include the topic of research misconduct.

Policies and guidelines also are useful tools. For example, the federal ORI provides [a policy on plagiarism](#) to differentiate this from issues related to authorship, and it has guidelines on how to avoid plagiarism (ORI 2013). However, factors such as cultural influences and education level can affect perceptions of whether a particular behavior is acceptable or not. Open and ongoing discussions about proper research practices are crucial. For example, it should not be assumed that each member of a multi-national research team has the same understanding about what constitutes plagiarism.

Setting the right tone and good mentoring go a long way towards enhancing research integrity. Encouraging mentoring throughout an organization is an effective strategy for preventing misconduct. Other prevention strategies, such as periodically verifying data collection methods, and discussing roles and responsibilities before and during a research project, are also essential.

Seeking clarification and advice from trusted colleagues or an ombudsperson when something seems awry can also help avert misconduct. As Steinberg (2002) notes, "The smart move is to incorporate preventive strategies into your everyday business practices so staff and colleagues know what is expected of them and of you."

### Detecting Research Misconduct



Multiple strategies are available to detect and deter research misconduct. For example, there are several online tools that can be used

to compare a suspected incident of plagiarism against a database of documents. The features of digital images can also be examined using [ORI's Forensic Tools](#).

The most important and effective means for preventing misconduct is the research community itself (Koocher and Keith-Spiegel 2010). Collaborators may suspect that data are not what they seem, or others in the same field may realize that they cannot verify data. What becomes crucial is how one responds to the situation. In particular, those senior to a suspected individual are usually in the best position to intervene and prevent research misconduct (Koocher and Keith-Spiegel 2010).

### Policies and Procedures for Managing Research Misconduct

Organizations should have policies and procedures for handling research misconduct. It is a requirement for organizations that receive federal funding. A typical organizational policy will outline:

- the definitions of research misconduct.
- procedures for reporting and investigating research misconduct.
- rights and obligations for all parties involved in the research misconduct process.
- provisions for protecting whistleblowers, individuals handling the misconduct process, and persons accused of research misconduct.

Moreover, academic institutions will normally have a Research Integrity Officer or other administrators involved in handling the allegation process.

The Federal Research Misconduct Policy describes the main phases that usually take place at the organization in response to an allegation of research misconduct. They are (OSTP 2000):

- (1) an inquiry--the assessment of whether the allegation has substance and if an investigation is warranted;
- (2) an investigation--the formal development of a factual record, and the examination of that record leading to dismissal of the case or to a recommendation for a finding of research misconduct or other appropriate remedies;
- (3) adjudication--during which recommendations are reviewed and appropriate corrective actions determined.

The process for managing research misconduct begins with the receipt of an allegation. Allegations can be raised in different ways; for example, during a face to face meeting, within an email, or during a phone call. Sometimes allegations are first received by a governmental agency, such as the federal ORI, and then referred back to the organization where the alleged misconduct occurred. In recent years, many misconduct allegations have been published on websites such as [Retraction Watch](#).

Not every allegation warrants a formal inquiry or an investigation. An allegation should be assessed for validity and requests for additional information from the person who alleges research misconduct may be necessary. Once an initial assessment has been made, a couple of outcomes are likely:

- There was a misunderstanding and there is no evidence of research misconduct.
- There is enough substance in the allegation to indicate that research misconduct may have occurred and an inquiry is necessary.

The inquiry will determine whether an investigation is needed. Typically, a committee examines the relevant information and decides whether to dismiss the allegation or [recommend an investigation based on the initial fact finding that indicates potential research misconduct](#).

The investigation is a formal examination and evaluation of all relevant facts and results in a recommendation to dismiss the allegation or a finding of research misconduct. The federal ORI provides [guidelines to assist organizations with conducting inquiries and investigations](#) for research funded by the DHHS. An organization may choose to apply federal standards to all potential research misconduct or choose to have similar or different standards.

If a finding of research misconduct is verified, the organization must then review the recommendations through the adjudication process and determine appropriate corrective actions. The actions typically range from a warning, further training, additional supervision, or sanctions to retraction of a work product or dismissal from one's job.

A federal agency may perform its own independent investigation if the case relates to a project it funded and if it considers the organization's investigation to be incomplete or to have left unresolved questions.

### Summary

Research misconduct can occur in any field of research. Strategies for preventing, mitigating, and detecting research misconduct are evolving. Organizations must have policies and procedures for handling allegations of research misconduct. Researchers have an obligation to avoid engaging in research misconduct or other behaviors that the research community would condemn and that erode public trust.

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