

FOSTERING RESEARCH INTEGRITY IN
DOCTORAL PROGRAMS: WHAT
RESEARCH AND EXPERIENCE TELL
US

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Why do we care?

- Damages reputation of science
- Wastes time and money (Morrison et al., 2005)
- May lead to harm of patients (Antonelli & Sandroni, 2013)

Defining integrity

- *Macmillan Dictionary*:
 - the quality of always behaving according to the moral principles that you believe in, so that people respect and trust you
 - the quality of behaving according to the rules and standards of your job or profession
 - the quality of being whole or complete, without any missing parts
- *Merriam-Webster Dictionary*
 - 1 : firm adherence to a code of especially moral or artistic values : **incorruptibility**
 - 2 : an unimpaired condition : **soundness**
 - 3 : the quality or state of being complete or undivided : **completeness**

What is research integrity?

- Responsible conduct of research
- Reproducibility
- Avoidance of scientific misconduct
- “adherence to rules, regulations, guidelines, and commonly accepted professional codes or norms” (Office of Research Integrity, US, 2003)
- “possessing and steadfastly adhering to high moral principles and professional standards (Steneck, 2006, p. 55)

European Code of Conduct for Research Integrity

- **Reliability:** quality of research, study design, methods, analysis
- **Honesty:** developing, undertaking, reporting, communicating; transparent
- **Respect:** colleagues, participants, society, ecosystems, cultural heritage, environment
- **Accountability:** publication, mgt, orgn, training, supervision, wider impacts

Netherlands Code of Conduct for Research Integrity, 2018

- Honesty
- Scrupulousness
- Transparency
- Independence
- Responsibility

United States Office of Research Integrity

- Research integrity training addresses:
 - Research misconduct
 - Protection of human research participants
 - Welfare of laboratory animals
 - Conflicts of interest
 - Data management practices, e.g., acquisition, management, sharing, ownership
 - Responsibilities of mentors and trainees
 - Collaborative research
 - Authorship and publication
 - Peer review

Scientific misconduct

- Does not include: honest error or differences of opinion.
- Does include:
 - **Data fabrication:** making up data or results and recording or reporting them
 - **Data falsification:** 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
 - **Plagiarism:** appropriation of another person's ideas, processes, results, or words without giving appropriate credit

Plagiarism

- Paraphrasing materials without giving proper credit to the original author
- Unauthorized use of ideas or unique methods obtained by a privileged communication, such as a grant or manuscript review
- Quoting directly without indicating that the excerpt is a quote and the source of the excerpt
- Stealing research proposals

Science and plagiarism

- The rewards in science are supposed to go strictly and exclusively for originality. That is why scientists strive so desperately to establish priority for their discoveries. It is also why, to judge from the frequency and bitterness of complaints, researchers sometimes fail to make fair acknowledgement of the work of their colleagues and competitors. The failure to make due acknowledgement of another researcher is, in a minor way, a theft of his work. Plagiarism is an interesting phenomenon because it carries this common sin of scientific reporting to extremes. Plagiarism, the wholesale theft of another's work, is so outrageous and obvious a crime that an outsider might predict scientists would never commit it. The evidence shows that, to the contrary, plagiarism in the scientific community is not rare, that it probably often escapes detection, that it takes time even for the most blatant cases of plagiarism to come to light, and that even those discovered committing plagiarism are often able to continue their careers unaffected (Broad and Wade, 1986).

Theories of scientific misconduct

- Bad apple theory
- Iceberg theory



Questionable research practices/"gray" science

- Nonrandom bias
- Post-hoc hypotheses
- Inappropriate statistical tests to enable a favorable result (P-hacking)
- Massaging of data
- Low statistical power
- Honorary authorship
- Misleading statements
- Selective reporting
- Hypothesizing-after-the-results (HARK-ing) (Wicherts et al., 2016)

• Nine circles of hell according to Dante

- Heathen and unbaptized who lived decent lives
- Lustful
- Gluttonous
- Avaricious and prodigal
- Wrathful
- Circles 6-9 old the sinners of the most vile nature
 - Heretics
 - Those guilty of violence against their fellow man, themselves, or god
 - All those who committed one of the 10 simple frauds (graft, theft, hypocrisy, and falsification)
 - Treacherous fraud (betrayal of kin, country, guests, and benefactors)

• Nine circles of hell according to Benson

- Researchers who divide a scientific test into the least Divisible unit to produce the greatest number of scientific publications
- Researchers who use “historical controls”
- Researchers who massage their data for a result
- Researchers who use inappropriate statistical techniques
- Researchers who selectively report data within a scientific report
- Those who borrow from others’ work without citation
- Researchers who fabricate data or results
- Researchers who falsify data or results
- Researchers who have committed unambiguous fraud

Threats to integrity

- High publishing demand, especially in science and engineering (Krstić, 2015)
- Lack of awareness, understanding, knowledge, esp. social sciences, humanities, arts
- Personality of those involved (Krstić, 2015; Satalkar & Shaw, 2019)
- Lack of appropriate training (Krstić, 2015)
- Overload of work
- “Funny”
- Too short a time to complete PhD/ limited resources
- Lack of rewards (Mumford et al., 2007)
- Supervisor misappropriation, lack of competence, disrespect, unfair authorship (Muthanna & Alduais, 2021)

Factors promoting research integrity

- Formalistic predisposition and/or prevention focus (Langlais & Blake, 2014)
- Occupational engagement
- Work commitment (Mumford et al., 2007)

Scenario 1

- Researcher (J. Douglas) well-known for her expertise on high blood pressure and kidney disease
- Researcher and boyfriend negotiated educational discount for computers, claiming they were buying the equipment on behalf of a research university and planned to use it in a clinical trial of a new drug, 2005 (<https://www.cleveland19.com/story/3148581/ohio-woman-sentenced-in-computer-scheme/>)

Scenario 2

- Senior and junior investigators collaborating on project
- Junior investigator did almost all of the work
- Long delay in writing up paper for publication; junior investigator went on vacation; upon return, found that senior investigator had prepared manuscript with his/her name as 1st author

Scenario 3

- Famous physician-researcher Zhang (UCSD) conducts eye research
- Enrolled patients in trial of drug to restore sight from age-related eye disease, 2016
 - ½ of enrolled patients did not have required disease
 - Failed to perform required screenings
 - Poor recordkeeping, lack of documentation
 - Audit of studies found lack of participant informed consent, failure to report problems to IRB (<https://timesofsandiego.com/tech/2019/04/18/human-research-violations-ucsd-kang-zhang/>) (April 18, 2019)

Scenario 4

- Student develops treatment for dry eye condition
- Professor forms private company and negotiates with pharmaceutical companies to develop patent based on student's research
- University accuses professor of depriving student and university of financial gain from invention (<https://www.cnn.com/2019/03/01/health/professor-accused-of-stealing-invention-lawsuit-trnd>) March 2, 2019

- **Doctoral students should receive:**

- Adequate research supervision: advice, funding, emotional support, accurate and appropriate feedback, oppty for collaborative reflection (Muthanna & Alduais, 2021; Pyhälä et al. 2015)

- **Research supervisors/mentors should:**

- Receive mentorship training, have experience (Labib et al., 2022)
- Serve as positive role models (Satakar & Shaw, 2019)
- Provide quality supervision, i.e. enculturation, critical thinking, emancipation, emotional intelligence (Lee, 2008; Muthanna & Alduais, 2021)

- **Strategies for building a culture of research integrity**

- Path for career progression
- Integration into decision-making processes
- Provision of funding and protected time for research
- Amplify efforts to improve science
- Champion efforts to support diversity among researchers
- Support initiatives to improve/enhance research culture (Kent et al., 2022)
- Opportunities for reflection (Martinez-Campos, 2022)

