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Research Foundation

Research Integrity and the Social and Psychological Environments of Science

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Overview

Three objectives:

- 1) Focus your attention on behaviors beyond misconduct that may reflect compromised integrity in research
- 2) To document that many scientists perceive high levels of injustice (unfairness) in the way that resources are distributed among scientists
- 3) To demonstrate that such perceptions are associated with behaviors that the science community should want to avoid

Research Methods

- 2002 mailed survey of U.S. scientists – biomedical and behavioral
- All scientists surveyed were funded by the U.S. National Institutes of Health (NIH)
- Study supported by U.S. Office of Research Integrity and NIH

- 2 samples:

Early-Career

1,479

(43% response)

Mid-Career

1,768

(52% response)

Research Integrity - Beyond Misconduct

Misconduct and Questionable Research Practices

- **Self-reported misconduct and questionable research practices within previous 3 years**
- **List of behaviors derived from focus groups with 51 scientists and from previous research**
- **“Yes” or “No” responses**
- **“Top Ten” identified by panel of compliance officers**

DeVries, Anderson, Martinson (2006). *Journal of Empirical Research on Human Research Ethics*, 1(1), 43-50.

Percentage indicating having engaged in behavior in past 3 years	Mid	Early
1. falsifying or "cooking" research data	0.2	0.5
2. ignoring major aspects of human-subjects requirements	0.3	0.4
3. not properly disclosing involvement in firms whose products are based on one's own research	0.4	0.3
4. relationships with students, research subjects or clients that may be interpreted as questionable	1.3	1.4
5. using another's ideas without obtaining permission or giving due credit	1.7	1.0
6. unauthorized use of confidential information in connection with one's own research	2.4	0.8
7. failing to present data that contradict one's own previous research	6.5	5.3
8. circumventing certain minor aspects of human-subjects requirements (e.g. related to informed consent, confidentiality, etc.)	8.9	6.0
9. overlooking others' use of flawed data or questionable interpretation of data	12.2	12.8
10. changing the design, methodology or results of a study in response to pressure from a funding source	20.6	9.5

Martinson, Anderson, DeVries (2005). *Nature*, 435, 737-738.

Many scientists perceive that resource distribution in science is not always conducted fairly

Survey Items: is peer review fair?

Proportion of each sample who “agree” or “strongly agree” with the statement...

"The 'peer review' system of evaluating proposals for research grants is, by and large, unfair; it greatly favors members of the 'old boy network.'"

- Early career: 72% agree or strongly agree
- Mid career: 59% agree or strongly agree

"The top people in my field are successful because they are more effective at 'working the system' than others."

- Early career: 79%
- Mid career: 75%

"Eminent scientists and scholars are more likely to receive research grants than others who submit proposals of about the same quality."

- Early career: 98%
- Mid career: 97%

Survey Items: do others behave well?

Proportion of each sample who report that, in the past three years, they have *observed* or *had other direct evidence* of a colleague...

"Using [their] position to exploit or manipulate others"

- Early career: 46%
- Mid career: 47%

"Using another's ideas without obtaining permission or giving due credit"

- Early career: 43%
- Mid career: 48%

"Inappropriate or careless review of papers or proposals"

- Early career: 35%
- Mid career: 51%

Cause for concern

- We can't judge the extent to which these perceptions reflect reality, but...
 - We should care how such perceptions come to exist
 - How many good and ethical scientists, perceiving that they are surrounded by corruption will have their own ethics corrupted in some small or large way?
 - How long will a scientist attempt to compete fairly when they perceive most others to be competing unfairly? How long before they take some action – legitimate or illegitimate – to correct the imbalance?
 - If they perceive that they have been dealt with unfairly in the review process, will they reciprocate when they themselves are a reviewer?
 - How many young talented individuals will avoid or exit careers in science because of such perceptions?

Are these perceptions associated with behaviors that the science community should want to avoid?

Theories

- The conduct of science is both **social and psychological**
- Understanding scientists behavior requires reference to various **social science theories**
 - Social Exchange Theory
 - Organizational Justice Theory
 - Others

Organizational Justice and Integrity in Science

- Policymakers concerned about maintaining the integrity of science have recently turned attention toward characteristics of the **environments in which scientists work** as potential factors promoting or inhibiting scientific integrity
- There is currently little empirical evidence about the role of perceptions of organizational justice in this regard

What is organizational justice?

Distributive justice pertains to perceptions of fairness in the distribution of resources – focused on outcomes

Procedural justice pertains to perceptions of fairness in the processes and procedures used in determining these resource distributions – process focused

Unique aspects of science

- The working environments of scientists include:
 - **Local settings** (e.g. department, center, university), but also...
 - **Dispersed, global groups** (e.g. peer-review networks, disciplines)
- So: issues of perceived justice extend well beyond the local institution
- Yet, most efforts to foster research integrity are focused at the level of individuals within a given institution or university

Resources and Their Distribution

- **Scarce resources**
 - grant funding, research positions, publications, laboratory space
- **Distribution processes and outcomes**
 - resource distribution through scientific review panels, hiring committees, editorial boards, space committees
- **Fair processes, equitable distribution**
- **Organizational injustice → Misbehavior**

Hypotheses

Hypothesis 1: The greater the perceived **distributive injustice** in science, the greater the likelihood of a scientist engaging in misbehavior

Hypothesis 2: The greater the perceived **procedural injustice** in science, the greater the likelihood of a scientist engaging in misbehavior

Hypotheses

Hypothesis 3: Perceptions of injustice are more strongly associated with the likelihood of misbehavior among those for whom the injustice represents a more serious threat to social identity (i.e., early-career scientists)

Notes on the next slide:

- The positive, statistically significant coefficient for **procedural injustice** indicates that those perceiving such injustice are more likely to report having engaged in one or more of the “top ten” misbehaviors
- The small, negative coefficient for **distributive injustice** indicates that in the total sample, this perception is not associated with the likelihood of reporting misbehaviors

Organizational injustice predicts “top ten” misbehaviors

Type III effects and regression coefficients for main effects logistic model predicting yes response to one or more of the top 10 misbehaviors

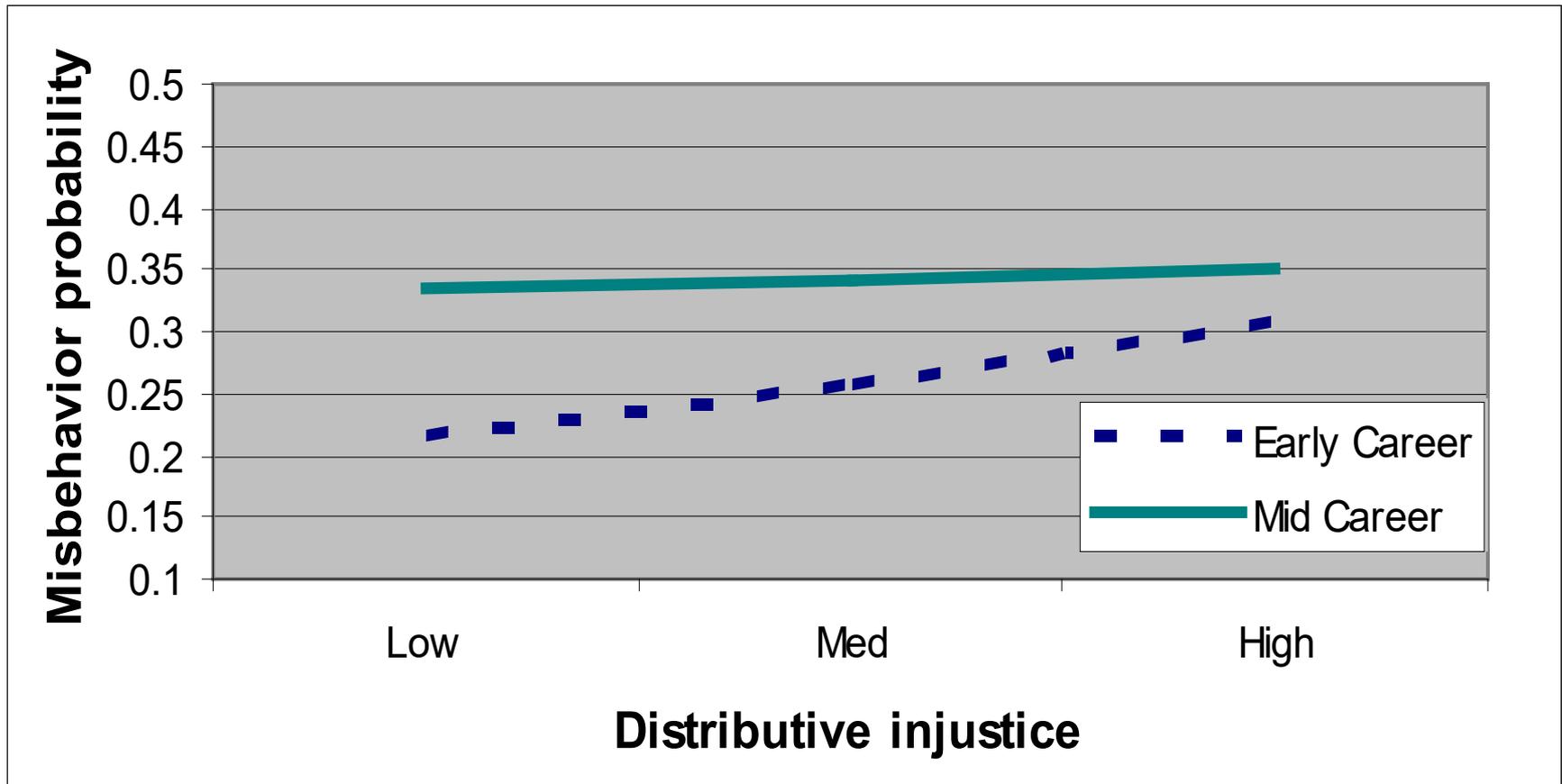
Effect	DF	coeff	Wald χ^2	p
Intercept	1	-.595	29.58	<.001
Distributive injustice	1	-.035	.60	.44
Procedural injustice	1	.309	35.25	<.001

(Model adjusted for career stage, field of study, sex, and marital status)

Martinson, Anderson, Crain, DeVries (2006). *Journal of Empirical Research on Human Research Ethics*, 1(1), 51-66.

Notes on following graph:

- Graph based on predicted values from a multivariate, logistic regression model predicting “yes” response to one or more of the “top ten” misbehaviors
- The upward sloping, dashed-line indicates that as perceptions of **distributive injustice** increase, so does the likelihood of reporting misbehaviors, but...
- The flat, solid line for mid-career scientists indicates that this is true only among early career scientists



Martinson, Anderson, Crain, DeVries (2006). *Journal of Empirical Research on Human Research Ethics*, 1(1), 51-66.

Summary of Main Findings

- Findings consistent with concerns about the influence of the social and psychological environments of science on behaviors
- Perceptions of **unfair review processes** in science are associated with self-report of misbehaviors among both early- and mid-career scientists
- Perceptions of **unfair resource distribution** in science are associated with self-report of misbehaviors, but only among those in the early-career sample

Implications

- Policy responses needed beyond what individual institutions (universities) can accomplish
- Research institutions, journals and national agencies need to ensure that their decisions and processes related to rewards (grants, publications, promotions) and responsibilities are as transparent and fair as possible
- May require reassessing some long-held precepts of peer review and other oversight systems in science
- Will require a willingness to restructure these systems to reflect the realities of science as it is conducted today

Additional Material – time
permitting...

Competition in Science – too much of a good thing?

- Competition ensures good science, but good science also requires cooperation
- Entrepreneurial expectations (proprietary concerns, financial stakes) may challenge cooperative conventions
- Is unbounded competition good, or does it interfere with cooperation to the harm of science?

Competition in Science

- In focus groups scientists talked about the negative effects of competition, including
 - strategic game playing
 - decline in sharing of information, methods
 - sabotage of others' ability to use one's work
 - interference with peer-review
 - damage to working relationships
 - questionable research conduct

Anderson, Ronning, DeVries, Martinson (2007).
Forthcoming - Science and Engineering Ethics.

Competition & Cooperation

- I elaborate further on my concerns about the damaging effects of excessive competition in science in a 13 September 2007 Commentary in *Nature* journal.

Next Steps in Research Agenda

- Our team has recently conducted a second, mailed survey of N=5,000 biomedical, behavioral, and social scientists in the U.S.
- Sample structure “nests” scientists (N=10) within departments and departments (N=500) within university (N=50)
- Analyses recently begun

Next Steps in Research Agenda

- Data structure allows assessment of perceptions of fairness in
 - Departmental processes
 - University level processes
 - Peer review processes
- As they relate to both positive and negative self-reported behaviors
- Additional focus on entrepreneurial pressures on scientists' behaviors in terms of
 - Increased reliance on soft money, relationships with for-profit entities, research agenda driven by financial incentives

So Many Labs, So Little Money

“The consequences of an overbuilt, underfinanced research enterprise can already be glimpsed...

“...worsening odds for success in grantsmanship are likely to foment unsociable behavior among scientists – perhaps even scientific misconduct...”

“The pursuit of commercial deals to finance research...could intensify, with competition leading to lowered standards of academic suitability and the greater secretiveness that is common to industrial research but anathema to university science”

(So Many Labs, So Little Money, Daniel Greenberg, *Chronicle of Higher Education*, 9/8/06)

Project Papers

- Martinson, Brian C., Anderson, Melissa S., and De Vries, Raymond. (2005). Scientists behaving badly. *Nature*, 435, 737-738.
- Martinson, Brian C., Anderson, Melissa S., and De Vries, Raymond. (2006). Scientists' perceptions of organizational justice and self-reported misbehaviors. *Journal of Empirical Research on Human Research Ethics*, 1(1), 51-66.
- De Vries, Raymond, Anderson, Melissa S., and Martinson, Brian C. (2006). Normal misbehavior: Scientists talk about the ethics of research. *Journal of Empirical Research on Human Research Ethics*, 1(1), 43-50.
- Anderson, Melissa S., Horn, Aaron, Risbey, Kelly R., Ronning, Emily A., De Vries, Raymond, and Martinson, Brian C. (2007). What do mentoring and training in the responsible conduct of research have to do with scientists' misbehavior? Findings from a national survey of NIH-funded scientists. *Academic Medicine*, 82(9), 853-860.

(Continued)

Project Papers

Anderson, Melissa S., Martinson, Brian C., and De Vries, Raymond. (In press; publication date 12/2007). Normative dissonance in science: Results from a national survey of U.S. scientists. *Journal of Empirical Research on Human Research Ethics*.

Anderson, Melissa S., Ronning, Emily A., De Vries, Raymond, and Martinson, Brian C. (In press; publication date 12/2007). The perverse effects of competition on scientists' work and relationships. *Science and Engineering Ethics*.

Anderson, Melissa S., Martinson, Brian C., and De Vries, Raymond. (In press). Extending the Mertonian norms: Scientists' subscription to norms of research. *Journal of Higher Education*.

Anderson, Melissa S., Martinson, Brian C., and De Vries, Raymond. (Under review). Competition, Cooperation and Normative Behavior in the Research Environment: Associations with Misbehavior among NIH-Funded Scientists (working title).

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