Evaluation of the NIH Grant Review Process

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Presentation for the Health Research Alliance

Richard Nakamura, Ph.D., Retired

Former Director, Center for Scientific Review, NIH
Former Scientific Director, NIMH
Former Deputy Director, NIMH
NIH’s mission is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability.

NIH achieves its mission largely through awarding research grants based upon peer review of applications from extramural scientists.
NIH Extramural & Intramural Funding
FY 2017 Enacted: $33.4 Billion

- Spending at NIH
  - $5.7 B Intramural Research
  - $1.9 B Research Management & Support and Other

- Spending Outside NIH
  - Supports over 300,000 Scientists & Research Personnel
  - Supports over 2,500 Institutions

FY 2017 Enacted: $33.4 Billion

- $27.7 B
  - Supports over 300,000 Scientists & Research Personnel
  - Supports over 2,500 Institutions
NIH Peer Review and Awards
Grant Applications Can Be Funded by One of 24 NIH Institutes or Centers

Office of the Director

- National Institute on Aging
- National Institute on Alcohol Abuse and Alcoholism
- National Institute of Allergy and Infectious Diseases
- National Institute of Arthritis and Musculoskeletal and Skin Diseases
- National Cancer Institute
- Eunice Kennedy Shriver National Institute of Child Health and Human Development
- National Institute on Deafness and Other Communication Disorders
- National Institute of Dental and Craniofacial Research
- National Institute of Diabetes and Digestive and Kidney Diseases
- National Institute on Drug Abuse
- National Institute of Environmental Health Sciences
- National Eye Institute
- National Institute of General Medical Sciences
- National Heart, Lung, and Blood Institute
- National Human Genome Research Institute
- National Institute of Mental Health
- National Institute of Neurological Disorders and Stroke
- National Institute of Nursing Research
- National Institute of Biomedical Imaging and Bioengineering
- National Center for Complementary and Integrative Health
- John E. Fogarty International Center
- National Center for Advancing Translational Research
- National Library of Medicine
- National Institute on Minority Health and Health Disparities

Clinical Center
Center for Information Technology
Center for Scientific Review
2-Level Review System for NIH Grants

First Level of Review
Scientific Review Group (Study Section) at CSR or IC

Second Level of Review
NIH Institute/Center Council
Peer Review and Funding of NIH Grant Applications

1. **Institution**

2. **National Institutes of Health**
   - **Center for Scientific Review**
     - Assigns to NIH Institute and Peer Review Group
   - **Study Section**
     - Reviews for Scientific Merit
   - **Institute**
     - Evaluates for Relevance to Research Priorities
   - **Advisory Council or Board**
     - Recommends Action
   - **Institute Director**
     - Takes Final Action
Role of the Scientific Review Group (SRG) or Study Section

A federal advisory group, consisting of independent scientists, that evaluates grant applications for NIH.

- Provides scientific impact scores and critiques of each grant application under the official supervision of a scientifically trained federal official

- The scores are rank ordered and percentiled and sent along with the application and summary statement to an institute for award consideration
The SRO Convenes the Study Section Meeting
Studying the review process
Improving Review: Goals, Measures, Tools

In the last few years, CSR has developed multiple approaches to examine the quality of review via the CSR Research Unit:

- Strategy for Quality Measurement
- CSR Quick Feedback Surveys
- Evaluation of Review Alternatives
- Ranking/scoring Studies
- Assessing Fairness and Reliability in Peer Review
Efficiency: Speed of review
Judging Performance by Outcome
Positive relationship of score to outcomes
Best rated application are the most productive
Issue of bibliometrics
Women and Black/AA Appear to be Less Productive by Bibliometric Measures

Analysis of Type 1 R01 awards in FY 2010 (N=3,900). Percentage of ‘Productive’ awards (awards with at least one publication with an RCR ≥ 3.0. Black (N=69), Non-black (N=3612) Not-Reported (N=219, not shown above), $\chi^2(2, N = 3900) = 12.82, p = 0.0016$. Male (N=2392), Female (N=969) Unknown (N=539, not shown above), $\chi^2(2, N = 3900) = 57.072, p < 0.0001$. 

\[ \text{PERCENT AWARDS WITH RCR} \geq 3.0 \]
Manipulating citation-based measures produces the wrong incentives

1. Publish many papers
2. Publish methods papers
3. Cite as many grants as possible on each paper
4. Use a low threshold for authorship and trade for such favors
5. Encourage students to cite one’s papers; specify a preferred paper
6. Discourage citations outside one’s “school of thought”
Scientists as Judges
Comparison of Quality of Discussion by Review Format

REG, TAM, VAM - The nature of the scientific discussions supported the ability of the panel to evaluate the applications being reviewed.

IAM - Was the quality of discussions appropriate to evaluate the impact/scientific merit of the applications?

Regular Meetings (REG) - Response rate = 50%, n = 7,094, 267 meetings
Teleconference Meetings (TAM) - Response rate = 40%, n = 1,083, 115 meetings
Virtual Assisted Meetings (VAM) - Response rate = 40%, n = 978, 61 meetings
Internet Assisted Meetings (IAM) - Response rate = 40%, n = 1122, 67 meetings

Likert type scale where 1 = very strongly agree to 7 = very strongly disagree
Fairness of Review
Fairness of Review

• In general, review is pretty fair
• Stage of career
• Gender
• Field
• Race/Ethnicity
• Reviewers
Concerns of Reviewer Bias

Probability of NIH R01 award by race and ethnicity, FY 2000 to FY 2006 (N = 83,188)

D K Ginther et al. Science 2011;333:1015-1019
The Hunt for Bias
An Anonymizing Study
Anonymization Experiments – Basic Assumptions

• Racial disparities in grant funding exists (Ginther et al): AAs award rates much lower than Whites. Other biases are suspected.
• Average preliminary overall impact scores account for variance in final scores that account for award disparity.
• The major hypotheses for score disparity are:
  • Reviewer bias and/or
  • Quality of application submission
Specific Aims

1. To determine if masking PII information from grant applications reduces the differences in final scores for Black and White applicants.

2. To determine if this reduces the differences in final scores for Male and Female applicants. (secondary)

3. To determine if this reduces the differences in final scores for Established and ESI applicants. (secondary)

4. To determine if this reduces the differences in final scores for applicants from more research intensive and less research intensive institutions. (secondary)
Discussion