

# Using Peer Review to Improve Research and Promote Collaboration

David J. Kupfer · Anneliese N. Murphree ·  
Paul A. Pilkonis · Judy L. Cameron · Rosary T. Giang ·  
Nathan E. Dodds · Kasey A. Godard · David A. Lewis

Received: 23 January 2013 / Accepted: 26 April 2013 / Published online: 22 January 2014  
© Academic Psychiatry 2014

## Abstract

**Objective** The declining success rate of National Institutes of Health (NIH) grant applications highlights the need for interdisciplinary work within a large, diverse department to improve chances of federal funding success. The authors demonstrate how systematic peer review promotes two goals: enhancing the quality of research proposals and cultivating a collaborative departmental culture.

**Methods** Changes to the Research Review Committee (RRC) in the Department of Psychiatry at the University of Pittsburgh were instituted to accommodate the increasingly interdisciplinary nature of grant applications, integrate revisions to NIH grant application processes, and incorporate advances in computer technology.

**Results** The internal peer review process is associated with success in obtaining research support and with significant levels of collaborative scientific work reflected in both grant applications and peer-reviewed publications.

**Conclusions** A rich collaborative environment promoted through a rigorous internal peer review system has many benefits for both the quality of scholarly work and the collegiality of the research environment.

**Keywords** Peer review · Collaboration · Research · Grant applications

The Department of Psychiatry at the University of Pittsburgh has consistently been a leader in research funding among the 86 departments of psychiatry awarded funding by the National

Institutes of Health (NIH). The department's continued funding success despite difficult fiscal conditions can be attributed to several strategies used to leverage its talent, infrastructure, and resources. We focus here on one of the most important strategies—a commitment to “peer review” in the broadest sense, whereby opportunities for discussion, critiquing, sharing, and a culture of collaboration are systematically promoted.

The sharing of collective wisdom through peer review improves the scientific work done by all. In terms of the grant application process itself, our Research Review Committee (RRC) provides an internal review (equivalent to the critique of an NIH study section) prior to formal submission. The goal is to ensure that the first submission of an application from the department falls into the category of being discussed and scored by an NIH study section (and is poised for potential funding with a resubmission). This outcome is critical in an era when only two submissions are permissible for any NIH grant application.

Systematic peer review also serves important interpersonal functions by creating an environment where investigators have a good understanding of the science being pursued by their colleagues. Thus, it promotes collaboration among colleagues, enhances interpersonal connections, and encourages pro-social attitudes that sustain a responsible ethical climate in which to conduct research. In this era, the scientist who assumes the role of “lone ranger” is the one at greatest risk intellectually, fiscally, and emotionally. Many of our department's initiatives are aimed at helping colleagues avoid this position.

Here, we describe how a systematic form of peer review is not only a method to enhance the scientific quality of research proposals, but also a vehicle for cultivating a collegial and collaborative culture in a large, diverse department. Such a culture helps investigators to stay abreast of advances in their

D. J. Kupfer (✉) · A. N. Murphree · P. A. Pilkonis · J. L. Cameron ·  
R. T. Giang · N. E. Dodds · K. A. Godard · D. A. Lewis  
University of Pittsburgh School of Medicine, Pittsburgh, PA, USA  
e-mail: kupferdj@upmc.edu

scientific fields and to adapt to a changing fiscal climate and requirements for grant submissions. We believe that intensive communication among faculty is essential for the department's continued funding success.

### Research Review Committee

Almost 40 years ago, a faculty committee for peer review of external research proposals was established in the Department of Psychiatry at the University of Pittsburgh. The major objectives for the committee were to assist investigators in writing research proposals that met the highest scientific and ethical standards, and to provide models for faculty (participating as both investigators and reviewers) of applications that fulfilled (or exceeded) all criteria for review, both scientific and administrative. The Chair of the RRC, appointed by the Chair of the Department, was responsible for selecting at least three reviewers from the entire faculty to read and comment on each proposal. Written reviews were forwarded to the investigator and often led to substantial changes in the research proposal. Reviewers had the option of remaining anonymous, but most chose to identify themselves, with the review process often leading to further discussion among faculty of the merits of proposals. The final proposal was forwarded to the RRC chair for a recommendation to the department chair, who then made a decision regarding departmental approval. Thus, the RRC functioned in an advisory capacity to the chair. It was uncommon for the RRC (or the department chair) to insist that a grant not be submitted; if reservations were noted, however, it was more common for investigators to receive advice that a submission be delayed for one cycle (or more) in order to strengthen it—advice that investigators most often heeded.

Over the years, applicants came to appreciate the advantages of review by the RRC, especially if their proposals were submitted in a timely way (e.g., at least a month prior to the NIH deadline) so that genuine discussion and revisions were possible. This system, which had relatively few grants to review in the 1970s, expanded in later decades. Fortunately, there was always a sufficient number of faculty members to serve as reviewers because all members of the department were potential candidates. The establishment of this peer-review process brought substantial positive changes to the collaborative ethos and academic culture of the department.

*Recent Innovations* Although its major functions remained the same, the RRC was restructured in August 2011. Changes were implemented to integrate both advances in computer technology and revisions to the NIH grant application process, including adjustments to the length of proposals, a reduction in the number of grant resubmissions, new rating forms, and conversion to a fully electronic process. We also wanted to

accommodate the increasingly interdisciplinary nature of the grant applications submitted for review, and with this goal in mind, we created a database summarizing the expertise of departmental (and outside) reviewers to ensure that all significant aspects of a proposal received a careful inspection. These innovations have not only made the process more efficient, but have also made the RRC more relevant in an era of interdisciplinary and translational science.

The methods used for the assessment of research proposals prior to August 2011 were reviewed by a departmental advisory committee, and a number of modifications were made as a result of this evaluation. First, the reviewer scoring form was redesigned to resemble the template used for the NIH review process. Reviewers are now asked to rate an application on a scale of 1 to 9 in terms of overall impact, approach, significance, innovation, statistical analysis plan, and human subject issues, and to provide narrative comments and suggestions for improving each of these areas.

Second, the exchange of hardcopy applications was eliminated, and the review process moved to a fully electronic system. Additionally, a database was created for the purposes of identifying faculty research interests and tracking the progress of the review process. This database contains information on faculty research expertise, current and past grant application submissions, grant reviews performed by faculty members, and ratings of their reviews. A scoring system for reviews was introduced as a form of quality assurance. RRC chairs rate reviewers on both the quality and punctuality of their reviews using a three-point scale from *outstanding* to *satisfactory* to *fair*. The sharing of critiques among reviewers was added as a final step in the review process. By comparing comments from the reviews provided by their peers, reviewers improve their own critiquing skills.

### Current Grant Review Process

Grant applicants are advised to submit their proposals to the RRC at least 1 month prior to the submission due date. The application is assigned to one of the three committee chairs, who then takes the lead on the review activity for that proposal. All applications originating in the Department of Psychiatry must be reviewed by the RRC. Faculty members, however, often participate as co-investigators for applications in which the principal investigator works in another department at the University of Pittsburgh or at another university. Currently, applications must also be reviewed by the RRC if the level of effort by the co-investigator in psychiatry exceeds 10 %.

As a first step, the committee chair approves the reviewers suggested by the applicant and/or selected from the database of faculty research interests, based upon their knowledge and expertise. Once approved, the reviewers who have confirmed

their willingness to read an application are sent all materials required to perform the review via email, including an RRC reviewer scoring form. Reviewers are asked to complete their reviews within five business days. After having received all critiques (usually a minimum of three), grant applicants are asked to provide a summary of their responses to the comments of the reviewers. The RRC chair then reviews all critiques and the applicant's response to the reviewers. If the proposal is recommended for departmental approval, all materials are forwarded to the chair of the department for final review. Once the review process is complete, the reviewer scoring forms and comments (and the PI's response to the reviews) are shared among reviewers. Figure 1 provides a flowchart of the process.

## Results

Beginning August 1, 2011, through July 31, 2012, 303 grants were submitted for review, a rate of more than 1 grant per working day. Of this total, 199 (66 %) were NIH applications. This workload required the assistance of 254 reviewers, with 148 (58 %) from the Department of Psychiatry, 94 (37 %) who have primary appointments at the University of Pittsburgh, UPMC, the Pittsburgh VAMC, or CMU, and 12 (5 %) from other universities and institutions.

The number of reviews done by individual reviewers ranges from 1 to 22, with a median of 2. Forty-seven reviewers have contributed 5 or more reviews. The average time it takes for an application to go through the RRC internal peer review is 14.9 days; this ranges from 1 to 52 days with a median of 13 days. The average time taken for reviewers to submit back their scoring form is 3.63 business days; this ranges from 1 to 14 days with a median of 3 days.

As described above, enhancing communication and collaboration is one of the goals of our internal peer review process. To document the “base rate” of collaboration achieved, 138 R01 grant applications submitted by the department in Federal Fiscal Year (FY) 2012 were analyzed and grouped into four different categories of collaboration as follows:

1. Faculty in Psychiatry working in an interdisciplinary fashion
2. Faculty working with colleagues in other departments within the University or the School of Medicine (including CMU)
3. Faculty working with colleagues in other universities
4. Faculty working primarily with closely aligned faculty and staff in a single group

Table 1 illustrates the breakdown of these R01 grant applications into their respective categories.

During this same time period, 492 papers from the Department of Psychiatry were published. An analysis of these publications demonstrated that 27 % of the papers represented intradepartmental collaborations, with another 15 % representing collaborations across departments.

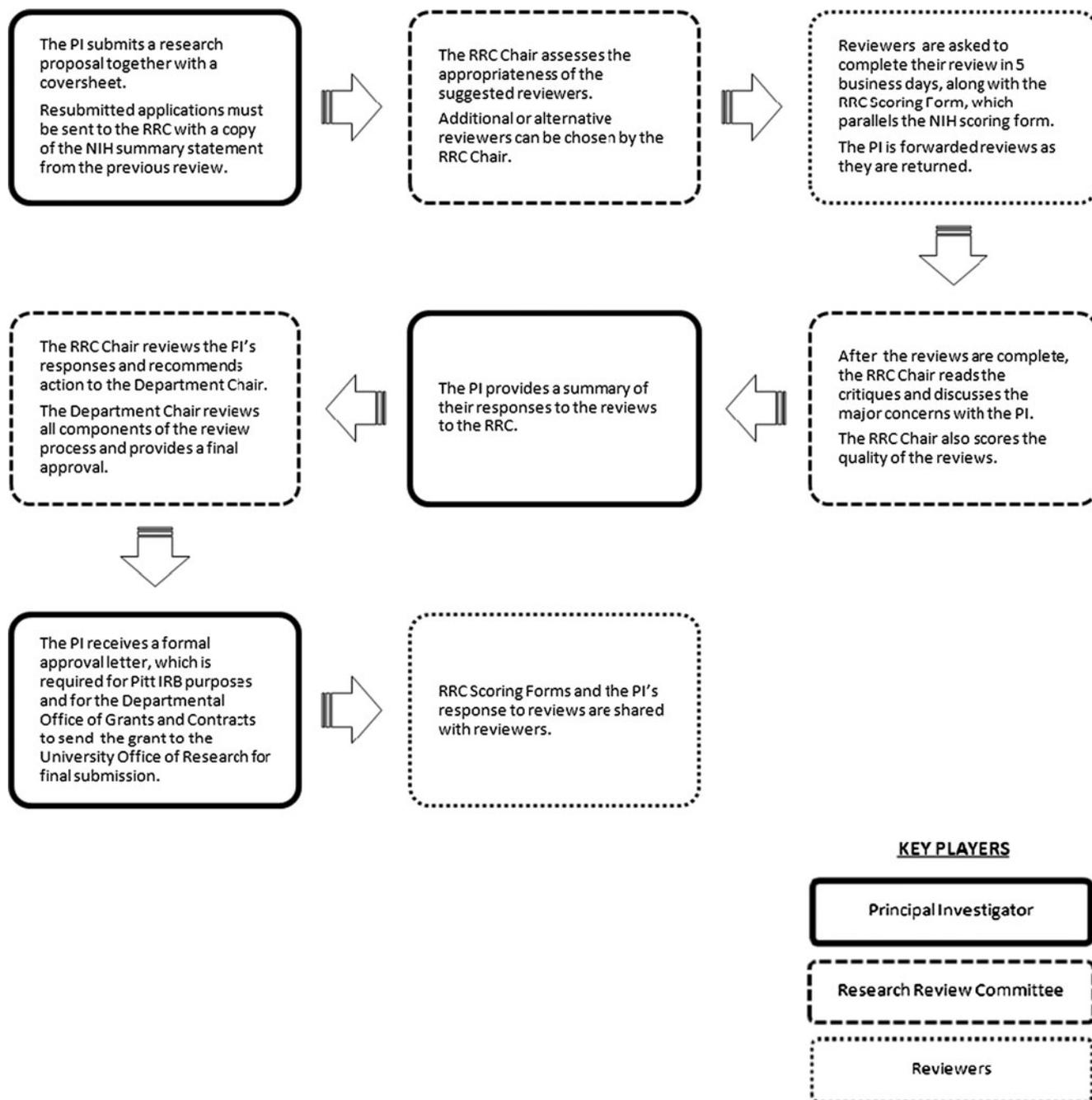
## Discussion

In academic settings where the submission of grants plays a major role, peer review of pending proposals has typically involved informal procedures where colleagues and mentors comment on grant applications and provide feedback. Such work is generally performed on an ad hoc basis. It is unusual to harness an entire department to systematically carry out grant reviews in the manner described for the Department of Psychiatry at the University of Pittsburgh, and we are not aware of any published descriptions of such activities in other departments and institutions.

Since its formation, the RRC's goal has been to provide a first round of peer review that strengthens all proposals from the department, making them as competitive as possible. Current NIH rejection rates are high—of the more than 68,000 grant applications reviewed by the NIH in FY 2012 (RPGs, Superfund and others), 81 % were rejected [1]. In addition, the NIH has reduced the number of allowable submissions per proposed project to two. NIH mechanisms account for the majority (67 %) of applications in the Department of Psychiatry at the University of Pittsburgh, and adapting to NIH changes has been, and continues to be, essential for the department to remain competitive.

Essential to the success of the review system is the role of the committee chairs. The experience and judgment of the committee chairs, who provide this administrative service in addition to their usual faculty responsibilities, are fundamental to the selection of appropriate reviewers and evaluation of reviews and responses. The administrative role of the committee chairs is to increase the probability of funding success for departmental grant applications and to act as advisors for the department chair. The committee chairs do not make personal recommendations regarding the proposed research in the grant applications being reviewed, but instead oversee the critiquing process for the purpose of quality assurance.

While the internal review system may help to generate more competitive applications, it is also complementary to initiatives for promoting a rich collaborative environment. The exchange of information and ideas creates an informal network throughout a large department, revealing links between research groups and intersections across different strategies and approaches. Reviewing grants broadens the knowledge base of all involved about the science that is ongoing in the department and the university, newly developed techniques, and interdisciplinary strategies for approaching



**Fig. 1** Flowchart detailing the internal review process for grant applications submitted by faculty members of the Department of Psychiatry at the University of Pittsburgh

complex questions. This increased knowledge has prompted many investigators within the department to establish new collaborations and to incorporate new strategies into their research.

This network extends beyond the department, as evidenced by the involvement of reviewers from outside the department (37 %) and at institutions outside the greater Pittsburgh area (5 %). The categorization of R01 grant applications in FY 2012 further demonstrates a high level of collaboration: 75 % of the applications included some elements of

interdisciplinary and collaborative work. As a further indication of collaborative activity, over 40 % of the peer-reviewed papers from the department involved coauthors from other departments in our university or other universities.

Through a non-adversarial review process, seasoned investigators can “nurture” new scientists and improve their chances of success as they compete for recognition in their fields of research. Increasing the probability of successful first-time submissions, and therefore helping new researchers attain visibility for their work in a relatively shorter amount of

**Table 1** Collaborative categories of R01 grant applications submitted by the Department of Psychiatry at the University of Pittsburgh in federal FY 2012

	Number of R01 grant applications submitted in FY2012 (%)
Category 1: Faculty in Psychiatry working in an interdisciplinary fashion	30 (22)
Category 2: Faculty working with colleagues in other departments within the University or the School of Medicine (including Carnegie Mellon University)	55 (40)
Category 3: Faculty working with colleagues in other universities	18 (13)
Category 4: Faculty working primarily with closely aligned faculty and staff in a single group	35 (25)
Total	138 (100)

time, may accelerate progress along career trajectories. For example, the probability of new investigators receiving subsequent funding may be improved, and they may establish more collaborative partnerships at a faster rate. This, in turn, may enhance the department's reputation and improve its ability to attract talented faculty recruits.

The importance of this mentoring culture is further highlighted when put into the context of current funding circumstances for new R01 grant applications. The success rate of the 40,427 first R01 submissions reviewed by the NIH in FY 2012 was 11 % [2]. The success rate of first R01 submissions in 2003 was 24 % [2], reflecting a 13 % decrease over 10 years. Shared expertise from senior investigators, especially those who have participated on review panels for the NIH, can increase the likelihood of identifying “rookie errors” made by those submitting their first R01 applications and help to improve their chances of success.

Conversely, collaboration between senior and junior researchers may help the former to “stay fresh” with their methods and approaches. Reviewers who are part of the NIH's Center for Scientific Review do not automatically approve a well-established scientist, no matter how impressive his/her track record is [3]. The act of reviewing in itself can help researchers to stay abreast of new developments in their fields of interest, increasing their awareness of innovative ideas being proposed by newer investigators. Studies by Kearney et al. [4] confirm the significance of review activities to a researcher's awareness of scientific advancements.

In addition to helping scientists stay informed of the newest ideas in the field, peer review of grant applications contributes to the academic culture of the department in ways described by Lipworth et al. [5], who studied the social and subjective dimensions of journal peer review. By encouraging

reciprocity, fostering a sense of academic “duty,” and stimulating networking opportunities that are complementary to other academic activities, the act of critiquing and contributing to the work of others promotes a sense of belonging to a “community of scholars” in which self-interest is bracketed and time sacrificed.

One could imagine, however, that difficulties might arise if grant applicants were unwilling to have other investigators with similar research interests review their work. The RRC allows faculty members to suggest reviewers and to request that certain reviewers not be given the grant application to review. Although such requests are respected by the RRC, virtually none are received. Rather, more often than not, faculty members specifically suggest reviewers who are familiar with their area of work and who could give the best possible review. This trend reflects the overall collaborative nature of the department by showing that faculty members generally assume that all departmental investigators who work on similar topics are well aware of each other's work, and they tend to collaborate rather than compete.

MD faculty members who feel ill-suited to review grant applications by PhD investigators, and vice versa, are another potential obstacle to successful interdisciplinary review. However, this has not been the experience of the RRC. For every grant, some reviewers are closely aligned with the investigator's area of expertise and others bring diversity to the review process. We believe that this complementary expertise of reviewers reflects the situation at NIH quite well and will provide the grant applicant with a diversity of reviews that they can expect at study section.

Although a sense of scholarly community is valuable, the degree to which reviewers feel obligated, from a sense of social pressure, to participate in the internal grant review process also needs to be considered. Reviewing a grant takes time away from other duties important to academic life, including personal research, writing, and teaching. Thus, the opportunity cost of reviewing can reduce the motivation to review and diminish the quality of reviews. The RRC's system for scoring reviews is intended to identify problems in this regard and to ensure quality control.

Despite a concern that reviewing grants can detract from other faculty duties, we note that on average it may take reviewers 2–3 h to review a grant and write bulleted reviews on an NIH-like review form, such that the cost of even the best paid reviewer (i.e., a senior full professor) would be 1/1,000th the size of the average grant obtained with a successful review. In terms of dollars and cents, the internal review process clearly makes sense. Moreover, reviewers realize that reaping the rewards of the internal review system requires a contribution of time and effort to the review process. Although many reviewers may indicate at times that they are not free to do a review, most faculty

members willingly participate in the review process when they are asked to do so.

Overall, the institution of a rigorous internal peer review system for all research grants being submitted by faculty in the Department of Psychiatry has many benefits. This system leads to improvement of grants *before* they are submitted to funding agencies and thus increases the competitiveness of grants submitted from the department. This is a direct benefit to the faculty, who are funded at a higher rate for their research endeavors. Of equal importance, however, are the less tangible benefits of this process for the collegiality of the research environment. Faculty who review each other's grants are better informed, have a broader understanding of new scientific developments and research strategies, are more likely to undertake collaborative research initiatives, and can be more supportive of each other's work. This highly supportive research environment is particularly advantageous to young faculty as they start independent research careers, but also helps keep senior faculty engaged in innovative research. As one faculty member commented, "internal reviews can be a pain, but several hours of work is well worth the effort and the return benefits."

## References

1. U.S. Department of Health and Human Services, National Institutes of Health, Office of Research Information Systems (ORIS)/Office of Statistical Analysis and Reporting (OSAR), (2012). Research Project Grants (RPGs) and Other Mechanisms: Fiscal year 2012. (NIH RePORT Table No. 205-A). Retrieved from [http://report.nih.gov/UploadDocs/T205%20abc%202012\\_1.xls](http://report.nih.gov/UploadDocs/T205%20abc%202012_1.xls)
2. U.S. Department of Health and Human Services, National Institutes of Health, Office of Research Information Systems (ORIS) / Office of Statistical Analysis and Reporting (OSAR). (2012). NIH Research Project and R01 Equivalent Grants: Fiscal Years 2003–2012. (NIH RePORT Table No. 209). Retrieved from [http://report.nih.gov/UploadDocs/T209%202012%20Succ%20Rates%20ALL%20RPG%20and%20R01%20Eq%20by%20Num%20of%20Amends\\_1.xls](http://report.nih.gov/UploadDocs/T209%202012%20Succ%20Rates%20ALL%20RPG%20and%20R01%20Eq%20by%20Num%20of%20Amends_1.xls)
3. U.S. Department of Health and Human Services, National Institutes of Health, Center for Scientific Review. (2011, September 29). NIH Peer Review Process Revealed. Retrieved from <http://public.csr.nih.gov/Pages/default.aspx>
4. Kearney MH, Baggs J, Broome M, et al. Experience, time investment, and motivators of nursing journal peer reviewers. *J Nurs Scholarsh.* 2008;40(4):395–400.
5. Lipworth WL, Kerridge IH, Carter S, et al. Journal peer review in context: a qualitative study of the social and subjective dimensions of manuscript review in biomedical publishing. *Soc Sci Med.* 2011;72(7):1056–63.