

Promoting gender equity in grant making: what can a funder do?

Underrepresentation of women at the higher ranks of medicine and science in the USA is well established. Career advancement of female scientists is reported to be adversely affected by gender disparities in start-up packages,¹ salary,² and grant application review processes.³ Because attainment of career development awards is associated with subsequent grant funding,^{4,5} understanding and targeting potential sources of bias in grant selection processes could be particularly important in improving the career advancement of women and in funding promising research.

Review for competitive career development awards for physician-scientists (ie, doctors who do research), such as the Doris Duke Clinical Scientist Development Award (CSDA),⁵ selects individuals annually on the basis of their potential to develop independent research careers and to contribute to biomedical advances. However, in this issue of *The Lancet* Holly Witteman and colleagues⁶ (Feb 9, p 531) report that selection processes that emphasise the scientist, as opposed to the science itself, could disadvantage women. Staff at the Doris Duke Charitable Foundation became concerned about gender disparities in competitions for the CSDA because, during 2013–16 (ie, four rounds of the competition), women only attained 16 (5%) awards of 312 applications, whereas men attained 52 (13%) awards of 413 applications.

To understand the factors that contributed to the selection processes, application data from CSDA competitions during this period (2013–16) were analysed in August, 2016. The gender of applicants was determined on the basis of common first name gender associations, web searches, and gender pronouns used in application materials. Applicant degree, publication record

(the number of peer-reviewed original reports), and proportion of professional effort allocated to research were self-reported. As a competition requirement, applicants chose and indicated their mentor, and these mentors self-reported their own funding (in 2014–16, but not 2013). The funding rank of each applicant's institution was categorised as described previously.⁵

Dichotomous variables that we used for our analyses indicated whether each applicant had a PhD (in addition to the MD or equivalent advanced medical degree that all applicants were required to have), worked at an institution that received the top 10% of the distribution of National Institutes of Health funding,⁵ were male or female, dedicated at least 50% of their professional effort to research, and had mentors with more than four grants. We first tested for univariate associations between these dichotomous variables and award attainment, and we then used a multiple logistic regression analysis with all six predictor variables to determine odds ratios that were adjusted for the effects of the other variables.

We found that the applicant degree, institutional funding rank, gender, and effort allocated to research, but not the number of grants that their mentor had, were associated with award attainment in univariate analyses (appendix). However, in multiple logistic regression analyses, only having a PhD (adjusted odds ratio 2.4, 95% CI 1.4–4.1; $p=0.0016$) and dedicating at least 50% of their professional effort to research (4.8, 1.1–20; $p=0.033$) remained significantly associated with award attainment. However, being female (vs male) had an adjusted odds ratio of 0.55 (95% CI 0.29–1.0; $p=0.056$)—ie, no significant association.

The association between having a PhD and award attainment suggests that additional training (such as

in study design, statistics, or grant writing) for non-PhD physicians or scientists might benefit this group. The association between time allocated to research and award attainment suggests that identifying ways to guarantee protected research time could enhance funding outcomes.

To increase gender equity in the selection process, the CSDA request for applications and review guideline documents were revised in September, 2016, to clearly articulate attributes held by successful applicants and evaluation criteria that used objective, non-gendered language. These materials were revised to minimise use of words that are thought to be implicitly associated with traditionally masculine traits.⁷ For example, the phrase “leadership potential” was changed to “promise to make significant contributions”, “importance” to “influence”, “innovation” to “originality”, and “creativity” to “inventiveness.” Magua and colleagues⁸ have confirmed these types of gendered associations of certain words in peer review.

We also attempted to use the application to encourage institutions to consider gender equity in applicant salaries. Department chairs were asked to provide the applicant's salary quartile range relative to those at the same faculty rank in the department. This question was not used in the application review. Applicants' salary quartiles showed a gender gap between women and men who entered the competition (appendix) that was consistent with gender gaps in physician-scientist compensation in previous reports.² Anecdotally, one female applicant reported that the salary question raised awareness about her low compensation, which prompted a sizable salary adjustment. In June, 2017, the difference in salaries by gender was shared with the department chairs who contributed the data. The gender salary gap was narrower in 2018, which was the second year that this information was collected.



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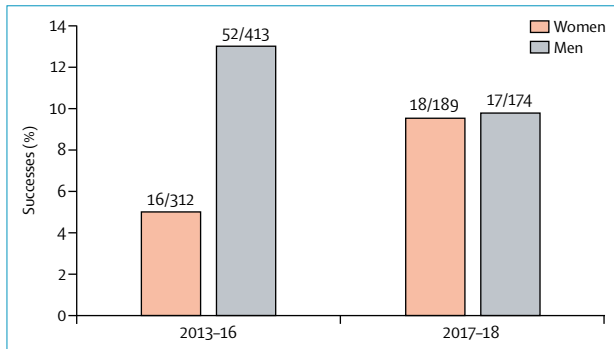


Figure: Proportion of women and men whose applications to the Doris Duke Clinical Scientist Development Award received funding

Data are the proportion of successful awards of the total reviewed applications, before (2013-16) and after (2017-18) implementing changes to target potential bias in the competitive selection process.

The application to the CDSA required each mentor and department chair to rate the applicant's professional characteristics and provide optional written comments. Differences in the ratings by applicant gender were analysed. We found no significant associations between ratings and gender within department chair ratings, but mentor ratings differed between the genders (appendix): mentors were less likely to rate female applicants as outstanding (ie, within the top 5% of faculty at the applicant's rank that the mentor knows) with regard to their potential for a research career, qualifications to conduct clinical research, and commitment to a research career compared with other faculty members at the same rank. Subsequently, we chose to consider only two rating categories in the mentor and chair evaluations that clearly showed no association with gender or that were deemed useful for the review (ie, ratings regarding knowledge and leadership), based on the goals of the competition. All other rating categories were eliminated because either they showed an association with gender and might facilitate the activation of implicit biases or they were not essential.

Although used infrequently (in only ten [$<1\%$] of 1413 recommenders' written comments), words that

referred to family, gender, and age were seen predominately in remarks for women (nine comments vs one comment regarding a man). New instructions to discourage potential bias in recommendations based on the University of Michigan STRIDE guidelines were therefore developed for the 2017 competition.⁹ Recommenders were asked to comment about the applicant's record and accomplishments and to avoid referring to personal circumstances, such as marital status, age, work-life balance, and roles outside of the professional setting.

All changes to application materials were implemented by September, 2016, for the 2017 award cycle. We have since seen an increase in the proportion of applicants who were female (43% in 2013-16 vs 53% in 2017-18) and in the proportion of women with successful applications (figure). We are cautiously optimistic that these improvements reflect the changes implemented, although we realise that these analyses were made with observational data, and thus do not establish causality.

Our summary recommendations are therefore: first, in requests for grant proposals and reviewer guidelines, describe the ideal candidate in non-gendered terms. Second, challenge institutions to take a close look at possible gender inequities—for example, in salaries. And finally, ask recommenders to address an applicant's objective research record and avoid references to personal circumstances that are irrelevant to the award. When using ratings, be sensitive to evaluation criteria that might be vulnerable to bias.

We recognise that complex factors contribute to the attainment of funding,¹⁰ some of which are beyond the scope of the review process. Nevertheless, we encourage funders to allocate resources for evaluation of gender equity in review processes. Non-governmental funders have an increasingly important role in

promoting the professional success of biomedical researchers and are in a position to improve equity, both by improving their own processes and by persuading academic institutions that equity matters.

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*Sindy N Escobar Alvarez, Reshma Jagsi, Stephanie B Abbuhi, Carole J Lee, Elizabeth R Myers
 sescobar@ddcf.org

Medical Research Program, Doris Duke Charitable Foundation, New York, NY 10019, USA (SNEA, ERM); Department of Radiation Oncology, University of Michigan, Ann Arbor, MI, USA (RJ); Department of Emergency Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA (SBA); and Department of Philosophy, University of Washington, Seattle, WA (CJL)

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