Now Hiring! Empirically Testing a Three-Step Intervention to Increase Faculty Gender Diversity in STEM

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Workforce homogeneity limits creativity, discovery, and job satisfaction; nonetheless, the vast majority of university faculty in science, technology, engineering, and mathematics (STEM) fields are men. We conducted a randomized and controlled three-step faculty search intervention based in self-determination theory aimed at increasing the number of women faculty in STEM at one US university where increasing diversity had historically proved elusive. Results show that the numbers of women candidates considered for and offered tenure-track positions were significantly higher in the intervention groups compared with those in controls. Searches in the intervention were 6.3 times more likely to make an offer to a woman candidate, and women who were made an offer were 5.8 times more likely to accept the offer from an intervention search. Although the focus was on increasing women faculty within STEM, the intervention can be adapted to other scientific and academic communities to advance diversity along any dimension.

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A homogenous university faculty limits student and faculty creativity, discovery, and satisfaction (Page 2007, Apfelbaum et al. 2014), whereas diversity in science furthers social justice, expands workforce talent, and increases objectivity (Intemann 2009). However, university faculty are largely homogenous on the salient dimension of gender, because the majority of faculty at all ranks worldwide are men, especially within science, technology, engineering, and mathematics (STEM) fields (NSB 2012, European Commission 2013). For example, 68% to 89% of all academic grade C to grade A STEM personnel in the EU are men, and 81% of tenure-track STEM faculty at US public and land grant universities are men (European Commission 2013, Oklahoma State University 2013). Therefore, increasing gender diversity among STEM faculty is one straightforward way to enhance science education and scientific research innovation.

What is less straightforward are the reasons why STEM fields are male dominated and what can be done to enhance diversity. There is a tendency to blame “the pipeline” because few women candidates populate STEM-faculty search pools. It is true that fewer and fewer women advance at every transition point from secondary school to college to graduate study such that proportionally fewer women are qualified for STEM faculty positions than men (McCook 2011, NSB 2012). However, social psychological factors, such as implicit gender biases among university faculty and administrators that favor men in STEM, may inadvertently perpetuate homogeneity (Moss-Racusin et al. 2012, Shen 2013). Fortunately, educational programs could potentially actively counter this bias. What is more, search committees typically do not understand how to recruit and attract diverse candidates. For example, many assume that the competition for diverse candidates is fierce among institutions and therefore do not undertake efforts to broaden the pool of applicants. This scenario is consistent with social-judgment biases such as the false-consensus effect (Ross 1977), which occurs when people overestimate the extent to which others believe as they do. As a case in point, only 29% of white women who had won prestigious fellowships in the United States (Ford, Mellon, or Spencer fellows) received multiple tenure-track job offers for positions they desired; the majority of these women (71%) did not receive multiple offers or had limited choices among less than ideal offers (Smith DG et al. 1996). Acquiescence that universities cannot diversify their faculty is a form of system justification that ultimately maintains the homogenous status quo (Jost et al. 2004). Offering search committees concrete best-practice techniques to address these psychological considerations could potentially enhance diversity. Finally, search committees must understand that partner accommodations and other work–life integration...
issues are central to recruiting women, because 83% of
women scientists in academia have partners also in academic
science (Schiebinger et al. 2008, Moors et al. 2014).

We designed an intervention to overcome these challenges.
As Timothy Wilson noted in his 2006 Science article on the
power of social psychological interventions, “Brief theory-
based interventions that focus on people’s construals can
reap large benefits” (Wilson 2006). Intervening in the faculty
search process is therefore one potential way to enhance the
representation of women STEM faculty at an institution. Past
intervention efforts to enhance gender diversity in academia
focused mostly on the pipeline issue by supporting women
students to perform well in, pursue, and persist in STEM
(Hullerman and Harackiewicz 2009, Miyake et al. 2010,
exception was a detailed case study of an ecology faculty
search employing intuitive (albeit effort-intensive) gender-
blind applicant tracking that achieved partial success (Jones
and Urban 2013). Theory-driven, randomized control trials
aimed at enhancing diversity are relatively rare in interven-
tion research (Moss-Racusin et al. 2014), and few studies
on the search process include faculty as participants (e.g.,
designed and empirically tested an intervention guided by
the tenets of self-determination theory (Deci and Ryan 2000)
aimed at enhancing the recruitment processes for multiple
and varied STEM-faculty search committees.

Self-determination theory (Deci and Ryan 1985, 2000)
proposes that creativity, motivation, and performance thrive
when three particular psychological needs are satisfied: to
engage in opportunities for learning and mastery (compe-
tency), to have flexibility and control over processes and
outcomes (autonomy), and to make meaningful connec-
tions with others (relatedness). Informed by this theory, we
designed a three-step faculty search intervention to supple-
ment the mandatory human resources (HR) training that
would (1) enhance the competency of the search committee
by delivering concrete strategies for conducting a broad
applicant search in the form of a printed “faculty search
toolkit,” (2) enhance the autonomy of the search committee
by showing them how to gain better control over possible
unintentional biases in their decisionmaking through a
30-minute oral presentation by a faculty member on the role
of implicit gender bias in skewing the candidate-screening
and interview processes, and (3) enhance the relatedness
of the search process more generally by both connecting the
search committee with a peer faculty member who
was supportive during the entire search process and by
specifically connecting job finalists with a faculty “family
advocate” totally independent from the search for a con-
dential 15-minute conversation. The faculty family advocate
meetings were designed to meet all Equal Employment
Opportunity rules by including all finalists, providing an
overview of policies and practices without inquiring directly
about a candidate’s marital or family status, and maintaining
the confidentiality of any information shared through the
discussion of work–life related questions. Family-advocate
conversations were in no way communicated to the search
committee nor had any bearing on the hiring decision.

The search committees in the no-intervention (status-quo)
condition received only the mandatory HR training. This
brief in-person training was conducted by an assigned staff
member from HR. The HR staff person provided a packet
of handouts that outlined compliance issues (e.g., must have
at least two people on every phone reference check) and
procedure issues (e.g., how to submit paperwork for the web-
posting of the vacancy advertisement). The HR training did
include a brief overview of antidiscrimination law, including
a handout with a list of protected classes and a list of ques-
tions committees were not allowed to ask. The emphasis on
this part of the HR training was on avoiding discrimination
lawsuits by treating everyone equally, akin to the colorblind
or gender-blind notion that gender or race “should not and
does not matter” (Neville et al. 2000, p. 60), which is limited
(Bagenstos 2006) and may lead, however inadvertently, to
greater bias (Richeson and Nussbaum 2004). More details on
the intervention and no-intervention conditions, including
the family advocate, are outlined in the supplemental method
S1 section; materials and facilitator guides are also freely
available at www.montana.edu/nsfadvance/resources.html.

Our hypothesis was that search committees randomly
assigned to the intervention, compared with the no-intervention, as-usual search procedures, would have an
increased number of women candidates considered for and
offered tenure-track positions in STEM.

Methodology
Our experiment took place across a broad discipline of
23 STEM-faculty searches during one academic year at Montana
State University (MSU), a Carnegie Foundation–ranked Very
High Research Activity (VHR) university in the United States (see
methods S1 for more details). At the time, the 235 STEM faculty
at MSU were largely homogeneous (81% men), making this a
representative context that mirrored national faculty gender
statistics (Oklahoma State University 2013) in which to test our
intervention. Moreover, the rural setting of the university, its low
salaries (lowest among the 102 VHR ranked universities; Curtis
and Thornton 2014), and the lack of a medical school also posed
recruitment challenges, allowing for a strong test of the inter-
vention. Our research is the first to use STEM faculty as participants
in a hypothesis-testing study on diversity faculty hiring.

Search committee chairs were identified and invited via
email by a faculty peer to voluntarily participate in a supple-
mental training to coincide, if possible, with the mandatory
human resource–search committee training, which all com-
mittees received (see supplemental methods and discussion S1).
None refused to participate. The selection of a faculty peer to
contact search committee chairs and to present the interven-
tion material were intentional to increase participation (see
discussion S1). Presenting material to each search committee
separately ensured a small group setting meant to enhance
engagement with the presentation.

Results

The three-step intervention was successful. Among searches in the intervention condition, more applicants overall were short-listed and phone-interviewed (mean (M) = 9.5, standard error (SE) = 1.5) compared with those in the no-intervention condition (M = 4.7, SE = 1.3; Cohen’s d = 0.99, t(21) = 2.26, p < .05). Importantly, searches in the intervention condition phone-interviewed a significantly greater percentage of women applicants (M\text{women} = 40.5%, SE = 7.4%) compared with searches in the no-intervention condition (M\text{women} = 14.2%, SE = 5.4%; d = 1.16, t(21) = 2.57, p < .02; figure 1), illustrating a large improvement in the representation of women on the short lists. Given that travel funding limits the number of finalists brought to campus for interviews in each search, no difference existed in the mean numbers of finalists brought to campus for interviews in the intervention (M = 6.1, SE = 1.4) and no-intervention (M = 3.6, SE = 0.5; p > .05) groups. However, women made up a significantly greater percentage of on-campus interviewees for searches in the intervention group (M\text{women} = 40.3%, SE = 6.9%) than in the no-intervention group (M\text{women} = 18.2%, SE = 7.3%; d = 0.92, t(21) = 2.12, p < .05), illustrating a large difference in the inclusion of women as finalists. Importantly, we ruled out alternative explanations and confirmed the effectiveness of our random assignment (see supplemental results and table S1).

Furthermore, 11 women were extended offers for tenure-track faculty positions—nine in the intervention condition and two in the no-intervention condition. Odds ratio statistics showed that a search in the intervention condition was 6.3 times more likely to make an offer to a woman candidate than a search in the no-intervention condition (d = 0.93; see figure 1). Moreover, women offered jobs were 5.8 times more likely to accept the offer from an intervention search (n = 7 accepted) than from a no-intervention search (n = 1 accepted; d = 0.80). The three-step intervention effectively increased the number of women hired as incoming STEM faculty at MSU. Subsequent application of our intervention to all STEM faculty hires with start dates in 2013–2014 academic year (n = 10 men and 10 women) and start dates in 2014–2015 academic year (n = 9 men and 9 women hired).

Conclusions

We tested a theory-derived three-step intervention that involved (1) a short presentation to search committees about overcoming the influence of unintentional (i.e., implicit) bias during the review process, (2) arming search committees with a guidebook on tactics for recruiting diverse candidates, and (3) providing access to a faculty family advocate who was unaffiliated with the search to confidentially discuss any work–life integration issues deemed appropriate by the candidates. The intervention measurably increased gender diversity among STEM faculty. Although the focus here was on increasing women faculty within STEM, the intervention can be adapted to other scientific and academic communities to advance diversity along any dimension.

Some pushback was experienced, as we expected, and a small number of male and female faculty expressed concerns that paying attention to gender diversity in STEM while conducting a faculty search was “lowering standards to fulfill a quota” (a sentiment that perfectly exemplifies gender bias). Indeed, a good next step would be to examine how faculty experience the intervention process itself (Moss-Racusin et al. 2014) versus the outcomes of the intervention as we reported here. For example, some faculty may believe that a focus on gender diversity is a form of reverse discrimination or that such a focus implies women are less competent and unable to make it on their own merits (Etzkowitz et al. 1994, Norton and Sommers 2011). Such mental frameworks probably have important ramifications for how people experience self-determination within what is perceived as a potentially threatening, high-stakes situation. Pushback notwithstanding, our brief three-step faculty search intervention was successful. We show that organizations can benefit from using psychological science to inform precise interventions. Although our data does not build on self-determination theory, it was inspired by and supports self-determination theory. Systematically testing theory through application can potentially contribute to theory-building in the future (e.g., Wilson 2006, Walton 2014). For example, future research could test which psychological need (competence, autonomy, or relatedness) was most essential to the success of the intervention and/or reveal the level at which it is important to foster psychological-need support, whether to the entire group (i.e., the search committee) or to an influential leader of the group (i.e., the search chair).
Worldwide, STEM funding agencies are investing heavily in diversifying the scientific workforce. As just two examples, the US National Science Foundation NSF ADVANCE-Institutional Transformation program and the European Commission genSET project have spent millions to bring about equality for women working in STEM. Our findings contribute to these important efforts. After all, a diverse faculty engenders social justice and better the conditions of underrepresented people working within STEM (Etzkowitz et al. 1994, Sekaquaptewa 2002). Diversity within STEM is essential for creating a thriving workplace and a learning environment replete with role models, diverse ways of thinking, and enhanced learning that elevates excellence and benefits scientific innovation, public health, and economic growth.

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Supplemental material
The supplemental material is available online at http://bioscience.oxfordjournals.org/lookup/suppl doi:10.1093/biosci/biv138/-/DC1

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