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FlashReport

A gender bias habit-breaking intervention led to increased hiring of female faculty in STEMM departments☆,☆☆

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ABSTRACT

Addressing the underrepresentation of women in science is a top priority for many institutions, but the majority of efforts to increase representation of women are neither evidence-based nor rigorously assessed. One exception is the gender bias habit-breaking intervention (Carnes et al., 2015), which, in a cluster-randomized trial involving all but two departmental clusters ($N = 92$) in the 6 STEMM focused schools/colleges at the University of Wisconsin–Madison, led to increases in gender bias awareness and self-efficacy to promote gender equity in academic science departments and perceptions of a more positive departmental climate. Following this initial success, the present study compares, in a preregistered analysis, hiring rates of new female faculty pre- and post-manipulation. Whereas the proportion of women hired by control departments remained stable over time, the proportion of women hired by intervention departments increased by an estimated 18 percentage points ($OR = 2.23$, $d_{OR} = 0.34$). Though the preregistered analysis did not achieve conventional levels of statistical significance ($p < 0.07$), the study has a hard upper limit on statistical power, as the cluster-randomized trial has a maximum sample size of 92 departmental clusters. These findings, however, have undeniable practical significance for the advancement of women in science, and provide promising evidence that psychological interventions can facilitate gender equity and diversity.

Women remain underrepresented in doctoral-level careers in science, technology, engineering, math, and medical (STEMM) fields (Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012; NSF, 2007). This gender inequity, paired with concurrent underrepresentation of racial minorities, has led numerous organizations to call for efforts to increase participation of women and minorities in STEMM (e.g., NSF, 2014; National Academy of Sciences, National Academy of Engineering, Institute of Medicine of the National Academies, 2006; NIH: Valantine & Collins, 2015; see also Corrice, 2009; Hill, Corbett, & St. Rose, 2010; Mitchneck, Smith, & Latimer, 2016; Sevo & Chubin, 2008). Many existing efforts to address these issues, however, are neither evidence-based nor rigorously assessed in experimental trials (Moss-Racusin et al., 2014; Paluck & Green, 2009). When systematically assessed, these non-evidence-based efforts either do not work or make problems worse (Apfelbaum, Norton, & Sommers, 2012; Dobbin & Kalev, 2013; Legault, Gutsell, & Inzlicht, 2011).

Interventions designed to reduce intergroup biases should be rooted in well-supported theory about the nature of prejudice and bias reduction. One such theory is the prejudice habit model (Devine, 1989; Devine, Forscher, Austin, & Cox, 2012), which conceptualizes bias as a mental habit and lays out the steps needed to "break the bias habit." Specifically, once a person is motivated to act in less biased ways, breaking the bias habit involves 1) becoming aware of when one is vulnerable to unintentional bias, 2) understanding the consequences of unintentional bias, and 3) learning and practicing effective strategies to reduce the impact of unintentional bias.

Devine et al. (2012) operationalized the components of the habit-breaking model into the *prejudice habit-breaking intervention*, which is

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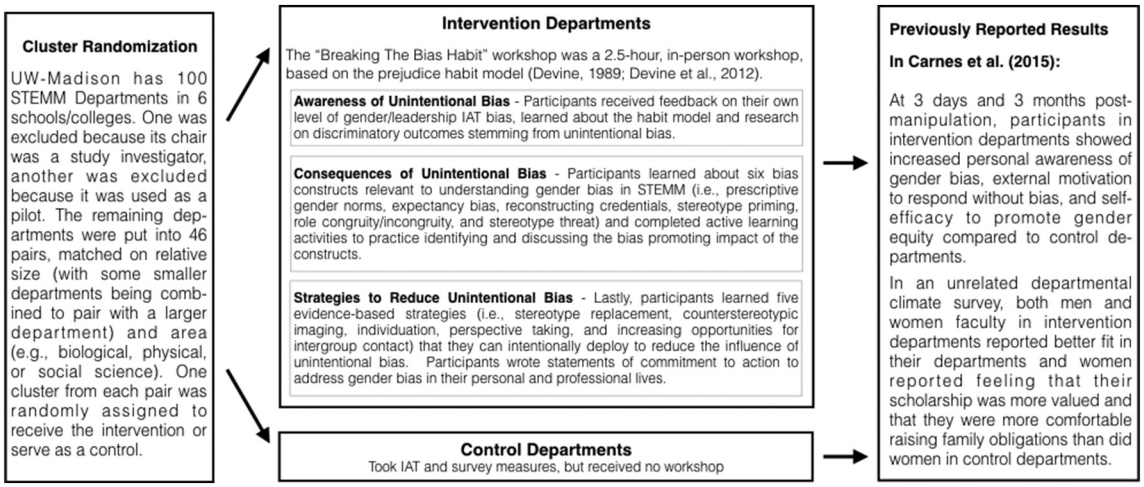

Fig. 1. The gender habit-breaking intervention. Study design, intervention components, and previously reported results.

thus far the only intervention experimentally shown to produce long-term changes in bias (Devine et al., 2012), with effects lasting at least 2 years post-manipulation (Forscher, Mitamura, Dix, Cox, & Devine, 2017). One iteration of this intervention approach is the *gender bias habit-breaking intervention* (Carnes et al., 2015), which focused specifically on gender bias in STEMM fields and was implemented in a 2.5 h workshop to individual departments.

The workshop (see Fig. 1 and Carnes et al., 2012) reviews the key components of the habit model (awareness, consequences, and strategies). To increase awareness, prior to the workshop participants completed and received feedback on a gender/leadership Implicit Association Test (IAT). The workshop opened with evidence of continuing gender bias in STEMM, including the underrepresentation of women in faculty and leadership positions and the potential adverse impact such biases for the overarching goals of advancing science, national health, and economic vitality. Attendees learned how unintentional bias function like habits, leading people to often respond in ways that contradict egalitarian values. They then learned about six "bias constructs" that represent common manifestations of gender bias generally and in STEMM more specifically (i.e., expectancy bias, prescriptive gender norms, role congruity/incongruity, stereotype priming, reconstructing credentials, and stereotype threat). To allow attendees to actively engage with the constructs and foster learning of new material, attendees next read and discussed case studies to practice identifying and examining the bias-promoting impact of the constructs. To promote efficacy to reduce bias, attendees learned five evidence-based strategies (i.e., stereotype replacement, counterstereotypic imaging, individuation, perspective taking, and increasing opportunities for intergroup contact) that have been shown to counteract unintentional bias (Devine et al., 2012); attendees were told that practicing the strategies would help them to break the gender bias habit. Attendees also wrote statements of commitment to action to address gender bias in their personal and professional lives, a strategy found to be effective in other contexts to promote behavioral change (Overton & MacVicar, 2008). By increasing attendees' understanding of unintentional gender bias and its adverse effects, we encouraged faculty to intentionally change their behavior to mitigate the impact of unintentional bias. We assumed that engaging faculty in this way would be the first step toward institutional transformation.

We tested the gender habit-breaking intervention's effectiveness in a large-scale cluster-randomized-controlled trial in 98 STEMM departments at the University of Wisconsin–Madison. Compared to control departments, intervention departments showed increases in personal awareness of gender bias and self-efficacy to promote gender equity three days and three months post-manipulation and increases in self-reported action to promote gender equity at the three-month assessment (Carnes et al., 2015). On an unrelated university climate survey, faculty in intervention departments reported feeling better fit in their departments, that their scholarship was more valued by their colleagues and that they were more comfortable raising family obligations than did faculty in control departments.

Although encouraging with regard to outcomes that would be expected to promote gender equity in STEMM, our previous results are exclusively self-report. To be impactful, the intervention must also produce changes in key behavioral outcomes related to reducing gender bias and STEMM. In the present work, we examine the impact of gender habit-breaking intervention on the gender of new faculty hires. We chose hiring patterns as our main outcome for a number of reasons. First, an effective intervention, ideally, would help reduce the underrepresentation of women in STEMM. Second, the intervention specifically discussed how bias can affect the likelihood of women being hired in STEMM (e.g., reconstructing credentials, role incongruity). Third, to the extent that unintentional gender bias contributes to the underrepresentation of women (see Moss-Racusin et al., 2012), participants' greater awareness of, and self-efficacy to overcome, unintentional bias as well as their written commitment to address gender bias should reduce the effects of unintentional bias on hiring, yielding more new women faculty hires. Fourth, hiring decisions are made by departments, not individuals, which is well-matched to the cluster-randomized design, in which departments were assigned to receive the intervention or serve as controls.[1] In prior tests of the impact of the habit-breaking intervention, outcomes were assessed at the individual level even when evaluated as the cluster level (Carnes et al., 2015; Devine et al., 2012; Forscher et al., 2017). In the present context, we explore the potential for the intervention to affect individuals in ways that may promote change in institutional level outcomes. Finally, to our knowledge, no past work has investigated the impact of a real-world intergroup bias intervention on this type of highly consequential outcome. We anticipated that, compared to control departments and intervention departments in the pre-manipulation period, only intervention departments in the post-intervention period would show greater gender balance in their new hires.

1. Method

The pre-registered analytic plan, dataset, and supplemental analyses are available at https://osf.io/9yt23/. All measures, manipulations, and exclusions are disclosed here and in Carnes et al. (2015). At the study

[1] Although all intervention department members were invited to attend, only a subset did.

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