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Promoting Institutional Change Through Bias Literacy

Molly Carnes,
Center for Women's Health Research and Department of Medicine and Department of Psychiatry and Department of Industrial & Systems Engineering and Women in Science & Engineering Leadership Institute (WISELI), University of Wisconsin-Madison; and William S. Middleton Memorial Veterans Hospital, Madison, Wisconsin

Patricia G. Devine,
Department of Psychology, University of Wisconsin-Madison

Carol Isaac,
Center for Women's Health Research, University of Wisconsin-Madison

Linda Baier Manwell,
Center for Women's Health Research and Women in Science & Engineering Leadership Institute (WISELI), University of Wisconsin-Madison

Cecelia E. Ford,
Department of English, University of Wisconsin-Madison

Angela Byars-Winston,
Center for Women's Health Research and Department of Medicine Division of General Internal Medicine, University of Wisconsin-Madison

Eve Fine, and
Women in Science & Engineering Leadership Institute (WISELI), University of Wisconsin-Madison

Jennifer Thurik Sheridan
Women in Science & Engineering Leadership Institute (WISELI), University of Wisconsin-Madison

Abstract

The National Science Foundation and others conclude that institutional transformation is required to ensure equal opportunities for the participation and advancement of men and women in academic science, technology, engineering, mathematics, and medicine (STEMM). Such transformation requires changing the habitual attitudes and behaviors of faculty. Approaching implicit bias as a remediable habit, we present the theoretical basis and conceptual model underpinning an educational intervention to promote bias literacy among university faculty as a step toward institutional transformation regarding gender equity. We describe the development and implementation of a Bias Literacy Workshop in detail so others can replicate or adapt it to their setting. Of the 220 (167 faculty and 53 nonfaculty) attendees from the initial 17 departments/divisions offered this workshop, all 180 who completed a written evaluation found the workshop at least "somewhat useful" and 74% found it "very useful." Over 68% indicated increased

Correspondence concerning this article should be addressed to Molly Carnes, MD, MS, Center for Women's Health Research, University of Wisconsin, 700 Regent Street, Suite 301, Madison, WI 53715. mlcarnes@wisc.edu.

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knowledge of the workshop material. Of the 186 participants who wrote a commitment to engage in new activities to promote gender equity, 87% incorporated specific workshop content. Twenty-four participants were interviewed 4–6 months after attending the workshop; 75% of these not only demonstrated increased bias awareness, but described plans to change—or had actually changed—behaviors because of the workshop. Based on our sample of faculty from a Midwestern university, we conclude that at least one third of STEMM faculty who are invited will attend a 2.5-hr Bias Literacy Workshop, that nearly all will find it useful, and that most will complete a written commitment to promoting gender equity. These findings suggest that this educational intervention may effectively promote institutional change regarding gender equity.

Keywords

gender bias; faculty; STEM; intervention studies; prejudice; academic medical centers

In 2006, the National Academies of Science (NAS; 2006) examined reasons for inequities in the career advancement of women in science, technology, engineering, mathematics, and medicine (STEMM). NAS rejected the notion that too few women enter most research fields (pipeline argument) or that female scientists are less committed to their careers (women's deficit argument). NAS concluded instead that inequities arising from systematic bias deeply rooted in assumptions about gender—sometimes conscious but more frequently unconscious—pose the greatest barrier to achieving gender equity in STEMM. This conclusion arises from research showing that such biases are embedded into the cultural fabric of our society and individuals' differential responses toward females and males are habitual (Devine, Pratkanis, Breckler, & Greenwald, 1989).

The National Science Foundation (NSF; 2007) and others (e.g., Office of Research on Women's Health, 2007; National Institutes of Health [NIH], 2008) conclude that institutional transformation is required to ensure equal opportunities for the participation and advancement of men and women in STEMM. The American Council on Education, in its Project on Leadership and Institutional Transformation (Eckel, Hill, & Green, 1998), asserted that institutional transformation "alters the culture of the institution…is deep and pervasive…is intentional, and occurs over time." Organizational change by whatever name or discipline—innovation diffusion (Rogers, 1962), research translation (Simpson, 2002), knowledge utilization (Havelock, 1973), organizational learning (Kotter, 1996; Nonaka, 1994), institutional transformation (Eckel, Hill, & Green, 1998)— rests on changing the attitudes and behaviors of individuals within an organization (Lindquist, 1974; Simpson & Flynn, 2007). Thus, in academic STEMM, any intervention that strives to achieve institutional transformation must engage the faculty.

In 2007, the American Association for the Advancement of Science (AAAS) coined the term "bias literacy" (Sevo & Chubin, 2008) noting that achieving literacy in a given topic area is a prerequisite to action. Scholars in learning theory and organizational change converge on the importance of being able to articulate tacit knowledge to bring it into consciousness (Howell, 1982; Nonaka, 1994). Paraphrasing Nonaka, who writes about processes that drive organizational change, the first step in changing an existing culture or practice is to take knowledge that is implicit and make it explicit by naming it. The explicit addressing of bias processes, based on the existing literature, underlies our approach to promoting bias literacy in STEMM faculty and ultimately institutional transformation.

In this article, we describe the development, implementation, and early results of a workshop designed to promote bias literacy as a step toward achieving institutional transformation with regard to gender equity. The workshop aims to (1) help STEMM faculty

at the University of Wisconsin-Madison (UW-Madison) achieve bias literacy, (2) encourage STEMM faculty to use their new knowledge by engaging in intentional behavioral change to reduce the activation and application of gender bias, and (3) ultimately achieve a change in the cultural norms of STEMM departments in a large public university. We present the theoretical basis underpinning the workshop; the structure and content of the workshop; the process of developing, piloting, and refining the final intervention; strategies for increasing attendance; and experience with the first 17 participating departments or divisions.

Conceptual Framework

Implicit Bias as a Remedial Habit: Theoretical Basis and Conceptual Model for the Workshop

Prejudiced actions can occur through unconscious (implicit) processes that may contradict one's conscious (explicit) beliefs (Devine, 1989). Individuals are frequently unaware of these habitual, implicit processes, or "habits of mind." Theory and research from the study of prejudice (Devine, 1989, 2001; Devine et al., 2005; Devine, Plant, Buswell, & Oskamp, 2000), self-regulation (Amodio, Devine, & Harmon-Jones, 2007; Amodio, Kubota, Harmon-Jones, & Devine, 2006; Bandura, 1991; Plant & Devine, 2008) behavioral change (Bandura, 1977; Carnes, Handelsman, & Sheridan, 2005; Janis & Mann, 1977; J.O. Prochaska & DiClemente, 1983; J.O. Prochaska & Velicer, 1997), science education (Handelsman et al., 2004; (Boonyasai et al., 2007; Howell, 1982; Kaufman, 2003; Knox, 1986), and continuing professional development (Overton & MacVicar, 2008; Wakefield et al., 2003; Wales, 1993) converge to suggest that change in any habitual response, including reduction of implicit bias, is a multistep process (see Figure 1). This broad range of research literature presents consistent advice regarding the steps necessary to overcome bias and produce intentional behavioral change. In the literature on prejudice, Devine argues that motivation to reduce one's prejudiced behavior is a prerequisite for attempting the change process.

Devine's (1989) research identifies two independent motivators: internal motivation to respond without prejudice that is part of a personal belief system and external motivation to respond without prejudice that stems from a desire not to appear prejudiced to others. These sources of motivation jointly determine whether people will put effort into overcoming prejudice. Research on intentional behavior change from other fields, including health behavior, counseling psychology, and education, confirms that being motivated to change is necessary but not sufficient for individuals to stop undesirable, habitual behaviors and adopt new desirable behaviors (J.O. Prochaska & Velicer, 1997). Concepts of self-efficacy ("Can I do this?") and outcome expectations ("If I do this, what will happen?") are central to intentional behavioral change. To produce actual changes in behavior, individuals must believe they can change their behaviors, and that their actions will produce a desirable effect (Bandura, 1977). Thus, they engage in a process of "decisional balance" to determine if the positive outcomes of behavioral change outweigh the negative (Janis & Mann, 1977; J.O. Prochaska et al., 1994). For example, positive outcome expectations for academic gender equity might include reducing faculty turnover, while negative outcome expectations might include needing to dedicate additional time to personnel decisions. Internal and external motivators, as discussed above, can influence this "decisional balance." Once an individual makes a commitment to behavioral change, there is broad agreement across disciplines that deliberate practice is required to effect a new habitual behavioral change (Ericsson, Karmpe, & Tesch-Romer, 1993; Plant & Devine, 2008).

J. O. Prochaska and DiClemente (1983) integrated a number of behavioral change theories into a "transtheoretical" model of change (see Figure 1). This model describes five "stages of change" that individuals and/or organizations go through (not necessarily linearly) as they move from negative to positive behaviors: pre-contemplation, contemplation, preparation,

action, and maintenance. J. M. Prochaska et al. (2006) applied this model to the readiness of faculty at one university to engage in actions to advance women scientists, although they did not address changing implicit stereotype-based biases. These stages of change find their counterparts in models of adult learning. For example, in his initial adult learning model, Howell (1982) noted that when acquiring a new skill, learners move from being unconsciously incompetent (analogous to precontemplation) to consciously incompetent (realizing they need to learn something new) to consciously competent (deliberately practicing) until they reach the ultimate goal of being unconsciously competent. Self-efficacy, decisional balance, and outcome expectations are also important aspects of these models.

With convergence among bodies of research on the need for motivation, self-efficacy, and positive outcome expectations to empower individuals to make a behavioral change, we next investigated methods to facilitate the development of habitual nonbiased behavior. Building on the literature reviewed herein, we focused on designing an educational intervention that incorporated effective practices from adult learning and continuing professional development (Boonyasai et al., 2007; Kaufman, 2003; Knox, 1986; Overton & MacVicar, 2008; Prosser & Trigwell, 1999; Wakefield et al., 2003; Wales, 1993) (Table 1) and provided participants with experimentally tested strategies from social psychology to promote effective self-regulation of implicit bias (Blair, Ma, & Lenton, 2001; Brown, Eller, Leeds, & Stace, 2007; Dasgupta & Asgari, 2004; Devine et al., 2000; Devine, Tauer, Barron, Elliot, & Vance, 1999; Galinsky & Moskowitz, 2000; Glick, Zion, & Nelson, 1988; McGlone & Aronson, 2007; Monteith, 1993; Muchinsky & Harris, 1977; Pettigrew, 1998; Vescio, Sechrist, & Paolucci, 2003).

Workshop Development, Piloting, and Revisions

As discussed above, we took an evidence-based approach to develop every aspect of the workshop. We utilized theoretical concepts from relevant fields, extrapolated research evidence from other contexts outside of academia (e.g., business), and incorporated our own experience delivering workshops to faculty (Sheridan, Fine, Pribbenow, Handelsman, & Carnes, 2010). The resulting Bias Literacy Workshop acknowledges workshop participants as experts, engages them in self-reflection and problem-solving, and provides opportunities for practice with immediate feedback. It also adheres to the tenets of effective group process (Bales, 1950; Jaques, 1991) and elicits a written Commitment to Change (Lockyer et al., 2001) from each participant as a way to encourage retention of information and application of strategies provided during the workshop. To increase awareness of implicit bias and help motivate participants, workshop department members are invited to take the Implicit Association Test (IAT) (Dasgupta & Asgari, 2004) via an emailed link three days before the workshop. This dual categorization task assesses the strength of association between male or female gendered names and words categorized as leader or supporter. Before launching the final version of the workshop, we conducted and videotaped three pilot workshops. Three tables contained in the online supplemental materials describe the final workshop format and content.

Procedure

Targeted Recruitment

The Bias Literacy Workshop is being presented to departments or units that function like departments (e.g., large divisions within the Department of Medicine or School of Pharmacy). As opposed to holding open workshops attended by members of multiple departments, presenting at the department or division level allows us to capitalize on the potential for diffusion within social units (Strang & Meyer, 1993) with the anticipation that

individual faculty members can reinforce and remind each other about what they learned and introduce the concepts and strategies to department members who did not attend the workshop. Faculty members and key administrative staff in STEMM disciplines received a personalized invitation to attend a workshop convened especially for their department or division from the principal investigator via email. This initial invitation was followed by an average of three reminder emails, also from the principal investigator. All messages were standardized across disciplines. In about one-quarter of the departments or divisions, administrators chose to send a reminder as well.

Strategies for Optimizing Workshop Attendance

We launched the workshop in its final form in October, 2010 and found that faculty attendance was lower than anticipated. To differentiate the workshop from other diversity programs on campus and provide a "hook" to entice faculty to attend, we modified the title of the workshop from "Breaking the Prejudice Habit Through Bias Literacy" to "Retaining and Advancing Excellent Faculty Through Bias Literacy." We also drafted emails for administrative leaders at each level of the institutional hierarchy to send in sequence. That is, the dean sent an email to department chairs, and then the chairs sent an email to their faculty. The emails indicated that although attendance was voluntary, this workshop was an important use of faculty time. We offered two workshops for large departments. The first workshop typically had low attendance, but we encouraged the department administrator to attend. In at least two of these departments, the department administrators returned to the chairs and emphasized the value of the workshop for the whole department; consequently, the second workshop had higher attendance rates. We also worked closely with the chairs and department administrators to find times most convenient for their faculty. The most effective strategy was to schedule the workshop during time allotted to an already existing department meeting, and expanding the original time slot to fit our 2.5-hr format. We also offered early morning sessions (7:00 a.m.) to clinical departments to avoid interfering with patient care schedules.

Workshop Evaluation: Data Collection and Analysis

The UW-Madison Institutional Review Board approved all data collection and consent procedures. We used mixed methods (Creswell, 2007; Hesse-Biber & Nagy Leavy, 2011) to evaluate the workshop, collecting data from attendance records, institutional databases, participants' written evaluations of the workshop, and follow-up interviews with selected attendees. The postworkshop evaluation queried changes in knowledge regarding the concepts taught, if the workshop was useful, and if participants would recommend the workshop to colleagues. A written Commitment to Change document, completed at the end of the workshop asked participants to complete two sentences: "I commit to overcoming gender bias in my department or division in the following way…" and "I commit to overcoming gender bias in my personal life in the following way…."

Follow-up interviews were conducted to further assess faculty perceptions of the workshop and its subsequent impact. We selected interviewees 4–6 months after the workshop using a purposeful sampling strategy (Patton, 2002) stratified by gender. Faculty who, by verbal comments and questions (negative and positive), demonstrated engagement during the workshop were sent an emailed invitation to participate in a 30–60 minute interview. One investigator (CI) performed all interviews. The nine-question interview (see Table 2) was designed to elicit rich, in-depth data for an interpretive, deductive analysis of attendees' reactions to the workshop (Denzin & Lincoln, 2005). We decided to interview 12 female and 12 male faculty based on data from Guest et al. (2006), which showed that data saturation is highly likely with this number of interviews. All interviews were digitally

audio-recorded, transcribed verbatim with identifying information removed, assigned a pseudonym, and sent to the interviewee for verification (Glesne, 1999).

Using NVivo qualitative software version 9 (Richards, 2006), three white female coders performed a systematic, line-by-line, deductive analysis (Boyatzis, 1998; Hesse-Biber & Nagy Leavy, 2011) of each interview, assigning sections of the narrative to stages of change based on the Transtheoretical Model (J. O. Prochaska & DiClemente, 1983). Two of the coders (CI and LBM) are qualitative researchers from health-related fields where they have utilized the Transtheoretical Model in practice and research. The third coder, a research assistant, was trained in qualitative methods. All members of the research team have the perspective of women in an academic setting. The coders first analyzed the transcripts independently, then met weekly as a group to reach consensus on the assignment of narrative to the stages of change. A comparison of independent coding for four of the transcripts indicated a 93% agreement between coders. Peer review, external audit, and data triangulation were employed to establish trustworthiness of the data (Creswell, 2007; Glesne, 1999).

Workshop Outcomes and Critical Findings

To date, we have presented the workshop to eight clinical departments, six basic science departments, and three clinical divisions within the Department of Medicine. Of the 510 faculty members invited to attend a workshop, 167 (33%) participated. Faculty attendance rates at the department level varied considerably from 10% to 95%, with an average of 39% of department members participating ($SD = 25$). There was no obvious relationship between attendance and department size, clinical versus basic science, surgical versus nonsurgical, or participation by the department chair. Overall, a higher proportion of female faculty attended compared to male faculty (42% vs. 29%). However, the proportion of male faculty at most workshops was higher than that of women faculty (61% vs. 39%) reflecting the larger number of male faculty in each department. Similarly, the proportion of white faculty at most workshops was higher than that of nonwhite faculty (83% vs. 17%) reflecting the larger number of white faculty in each department.

Results From Workshop Evaluation Forms

Key departmental administrative staff members were also invited to attend, bringing the total number of attendees to 220. Of these, 180 completed the postworkshop evaluation form. All found the workshop at least “somewhat useful” and 134 (74%) found it “very useful.” Only 4 (2%) indicated that they would not recommend the workshop to others. Table 3 illustrates the percent of attendees who reported enhanced knowledge regarding the concepts taught during the workshop. Nearly 70% reported increased knowledge in all content areas. Evaluation of the written Commitments to Change from the 186 attendees who completed this exercise revealed that 143 (87%) planned to incorporate at least one element from the workshop into actions they would take to promote gender equity at work and at home. The most frequently cited actions included individuating, stereotype replacement, and counterstereotype imaging.

Results From Interviews

Twenty-four of the 55 faculty members invited for a face-to-face interview elected to participate (44%), while eight declined and 23 did not respond. In total, 48% of the men, 63% of the women, and 22% of the nonwhite faculty who were invited for an interview either declined or did not respond. Of the 24 who opted to participate, 14 were physicians from clinical departments (7 male, 7 female) and 10 were PhDs from basic science departments (5 male, 5 female). This group included five professors, nine associate professors, and ten assistant professors. Seven participants (30%) were nonwhite: 2 African

Americans, 2 Asian Americans, and 3 Asians from India. Interviewees who reported an initial reluctance to attend the workshop cited confusion about the workshop purpose, feeling social pressure to attend, perceived redundancy with previous diversity programs, and too large a time commitment. Three interviewees reported attending out of loyalty to the principal investigator. Following the Transtheoretical Model (J. O. Prochaska & DiClemente, 1983) framework, we assigned interviewee statements to stages of change. The content of statements frequently reflected several stages, consistent with the circuitous nature of behavioral change.

Precontemplation—Eight faculty (7 male, 1 female) expressed comments consistent with the precontemplation stage. Male participants from STEMM departments with a large proportion of female faculty were most likely to be precontemplative, denying that personal bias and departmental bias could exist: “And if we had a…patriarchal department then I might feel differently, but because many of our senior colleagues and our chair is a female, it’s just not an issue.”

Five of the 12 male interviewees denied personal gender bias: “To be honest, I think that even though I’ve felt that a lot of the information was fascinating, I didn’t see in myself a significant bias.” None of the women expressed disbelief that they could be biased.

Diversity policies appeared to have created a backlash among some male faculty. As one non-Caucasian male stated:

> People are desperately looking for a woman to…for example, you go [and] the officer [of a professional organization] asks, “Do you know any female who would like to serve on the committee?” He doesn’t ask, “Do you know of a minority who would like to serve on the committee?”

One female participant declared, “there is a perception among the men, that they are now a discriminated-against minority.”

Another participant was reluctant to endorse personal bias, but stated:

> It may make me hesitant—well, how much do I really want to invest in this person if when she’s ready to have a kid, everything we’ve worked on is not going to happen for five years or 10 years? … I don’t know if that’s a stereotype exactly but that’s a preconceived notion I might have.

Contemplation: “It hurts your brain.”—Twenty-three of the 24 faculty made contemplation statements predominately acknowledging that the workshop increased their awareness of personal bias as well recognition of bias in others. Five faculty referred to the workshop as “eye-opening,” and described bias as “not easy to recognize if you are or aren’t and you probably are.” Both men and women were surprised that males and females are equally biased with regard to gender. Most interviewees did not remember the specific names of the constructs or strategies taught during the workshop, but were able to describe their characteristics and reiterate concepts presented in the case study vignettes.

Compared to women, male faculty expressed the strongest feelings about the preworkshop IAT. One refused to take it out of fear: “That test is a little scary because it’s telling me that I’m biased…I would feel really bad because I believe I don’t have it, so those tests might make me feel bad (laugh) honestly.” Another blamed the test when he received IAT feedback showing gender bias:

> I never went back and looked it up or did a lit search to see if, is this really valid or not…maybe it showed that I was more biased than I thought I was, and that caused dissonance, and so I wanted to blame the tool rather than me.

A third response to the IAT was guilt. "I think I can pick up explicit stuff but the implicit stuff, I was like 'Wow, you're relatively clueless' (laugh)." Another male stated, "No one has ever accused me of being a chauvinist bastard or whatever (laugh) except for myself after taking those tests."

One male summed up the difficulty of considering whether one might be biased:

> I don't spend much of my time thinking about gender issues. I probably devote less than 1% of my brain power to this issue. I just don't think about it very often. And so, when you're sort of being faced with questions, which you've never really thought about in any depth before, it hurts your brain, you know what I mean?

This male attended the workshop because of problems he encountered when mentoring women faculty.

> This is something I see every day…The moms in the world are women…First we tell them not to feel bad about it. I mean because you can just tell they feel so bad about it. And they feel bad because they feel like they're doing a crap job at home and they feel like they're doing a crap job here.

Seven out of 12 women interviewed recounted experiences of being a target of bias, both personally and professionally, "My mother-in-law who, just last week, said 'Gosh, you travel so much. I can't believe how much you're traveling and that your kids are so well adjusted.'" Another woman, an assistant professor, related how the workshop enhanced her ability to recognize certain experiences as gender bias, "I was meeting some county people and…another faculty had introduced me as 'This is our new specialist,' and he looked at me and said, 'But you're a girl' (laugh), and I don't think he meant anything negative by it." Women often "softened" their perceptions of discomfort by reframing negative comments.

Many women physicians were acutely aware of gender bias on the part of nurses in the hospital:

> [I ask] "Could you please do this for me when you get a chance?" It's a different dynamic versus the male attendings that walk in the room and say, "I need this, this, this, and this by this time because that's what is going to work best for my schedule." And it's a different response to them versus us the "Well that's just not going to happen because we don't have the nursing power. We can't do that. It's just not going to happen." I get that a lot.

Male physicians also recognized biased communication between nurses and women physicians: "You can see it, and it's just so palpable it's ridiculous that you can see it."

Compounding women's discomfort with being a target of bias was discomfort facing their own biases. Nine of the 12 women reported "feeling bad" about recognizing their own bias toward younger women. One woman physician, self-described as agentic, stated her frustration with women residents who will not make decisions:

> I have a hard time with the stereotypical female learner…I get frustrated very easily and I have to make a conscious effort to not show my frustration…And I don't know if they're afraid to be shut down or what the problem is, but it drives me insane.

These comments exemplify the incongruity of gender bias for women. Many felt bad about judging younger women harshly, "especially if there is a woman who's perhaps less

outgoing and doesn't know how to play the game as well." One woman reflected that her assumptions about a younger woman–"because you're so quiet, are you less confident?"—resulted from her own history—"I've been the object of that too." Only one woman endorsed giving preferential treatment to other women, stating that she reacted harshly to her male students and was "quick to forgive" her woman student who had "stumbled quite a bit."

Another woman scientist summed up the complexity of personal bias for women:

> Well, like I was just telling you with the student, I feel awful. I feel terrible for thinking that the men work harder than the women or the men seem more driven or the men seem more serious about it. I feel really guilty about it, and I'm not really quite sure what to do. I'm kind of conflicted because part of me wants to go to the women and say, "Come on! Work harder…you've got to work harder than these guys. Be here before them, stay later than them." So then of course, that kind of perpetuates my own [bias]. It sounds stupid [to ask], "But can women really handle this?" Which is dumb because I'm a woman in science.

Contemplation segued to preparation and action as these women described, "I have to make a very conscious effort to step back" and "I don't feel good about [bias toward women], but it feels good to recognize it."

Preparation and Action—Seventy-five percent of the faculty described plans to change—or had actually changed—behaviors because of the workshop. One woman physician was motivated to "treat people who I supervise equally and hopefully change the environment." A male physician started addressing people he did not know well, whether male or female, with a more formal address thereby promoting role congruity for women in high authority positions. One woman physician wanted to give her women residents "more time before I make an assessment of how I'm going to grade them," thus practicing individuation. Two participants mentioned establishing the value of applicant credentials before interviewing applicants to avoid reconstructing credentials. One male interviewee stated:

> [I] became probably more conscious…about the reviewing process of the grant or such stuff. I'm not sure if this is the right way or not, but I try not to look at the name first or any background. I thought that probably the best way is not trust myself so much.

One woman wanted to avoid being "more proactive" for women and said, "I actually want to be blind if I can, so I try not to look at author lists." Another woman participant employed stereotype replacement by reading research papers and not assuming "that the first name is male. She also took action when she noticed "people doing that in my lab over and over again and I try to correct them."

During the workshop, the presenters reiterate that the strategies are part of a toolkit and can be used in combination. One woman physician described a shift in her attitude that reflected three concepts taught during the workshop: stereotype replacement, individuating, and perspective-taking:

> If there is an employee or [if] a resident is saying that "I have to take the afternoon off," and "I have to ask a certain time off," and "because of my family issues"…So instead of jumping to the conclusion and saying that this is terrible—women just cannot commit and they're not as devoted to their work—and now I take a step back and say yes, women tend to have more responsibilities at home. But I'm more focusing on the results and they might be leaving work a little earlier but do they respond to questions and demands and get their work done by certain deadlines.

Another woman faculty member used stereotype replacement to cope with being a target of bias. She reframed her colleagues' reactions by labeling their behavior as stereotypical:

> I'm hoping in a way that it empowers me more that I can recognize it, and when I'm feeling the negative feelings that you feel from it, that I can recognize that this isn't something that I have. I don't have to have negative feelings toward this, this is someone who is having some kind of bias, this is their kind of issue that they should probably deal with and I just need to move past that and work through it on my end as to what I can do.

One female participant reported that, since the workshop, her chair now frequently talks to women faculty about gender issues within the department:

> He's tough, but he's very respectful and tries and does whatever he can for those [women] that are in the department. So he's very good in that way. So that made me feel great that he's even considering positions that women would normally never fill.

As part of the workshop, the presenters emphasize the need to humbly accept personal bias and deal with it rather than attempting to be gender-blind. One male faculty member has now opened the door for communication with his mentees:

> So she's a young woman, she's married, she has no kids, she has plans on having kids at some point. And I…decided to just candidly broach the topic with her. Not trying to do it in a judgmental or like "Well you can't be promoted if you do that kind of way," but just trying to be open with her about it like "What are your plans in this regard? You don't have to tell me, but I'd like to help you with this."

Maintenance—Six interviewees communicated maintenance statements, five of whom were former department chairs (4 males, 1 female) who reported attending previous diversity training activities. One chair, who had been instrumental in increasing the representation of female faculty in his department from 10% to over 30%, viewed the increased presence of women as a "really positive thing" because it "feels different… behaviors that might have been tolerated in the past are just completely off the table now." Another previous chair took the IAT and reported having an "inverted bias" because, while taking the IAT, he thought of his wife who is also a professor:

> I read these characteristics and I found myself, saying to myself, "Hang on a second, those leader ones, they sound just like my wife. They said that that is one of the strategies these people suggest to use, to overcome the implicit bias—it's to think of individual models…And what I suspect, having done that test, and having that experience of being able to flip a bias, just by the thought processes I had when I went in, suggests to me that these biases might be more malleable than those tests would suggest.

By using counterstereotype imaging, he was able to regulate his responses.

Several faculty members employed practical strategies. One male, an underrepresented minority, actively worked with women to give them strategies for success. He reported giving a new woman candidate advice for negotiating her position: "Your first job, I know you're excited, it's good to come back and enjoy it, but you need to ask for x,y,z because at the end of the day, you need to be able to accomplish your goals, and everyone wins if you do that."

One female associate professor reported routinely accepting when asked to speak: "And a lot of the people just tell me to my face, 'Oh, we're trying to find a speaker, we really want a

good woman speaker. Will you do it?' And I always try to say yes in that situation." Expecting women to serve as representatives of their gender is part of the "institutional housekeeping" role that women frequently assume in many departments (Bird, Witt, & Lang, 2004). Though departments are attempting to ensure that women are represented, five of the 12 women interviewed complained of the inordinate burden of committee work, noting that the obligation and responsibility of these positions do not necessarily promote equity and advancement. Only one woman had acted to address this concern with her colleagues and department chair.

Finally, a female associate professor described mentoring younger women, many of whom come from a culture where women rarely speak: "And I say, 'This is not going to be the [person] we see at your defense. You are the warrior princess. You will not be taking any claptrap from any of your examiners.'"

Discussion

In this article, we describe the development, implementation, and early results of a theoretically informed, evidence-based workshop intended to drive institutional transformation in gender equity by enhancing bias literacy among faculty. To our knowledge, this is a unique intervention for promoting gender equity in STEMM disciplines by addressing root causes of persistent and recurring gender bias. It is also unique in its approach to understanding implicit bias as a habit that can be changed by adapting approaches proven effective in changing other habitual behaviors. Early results from 17 departments and divisions indicate that attendees found the workshop valuable, that most of those we interviewed are contemplating their own personal biases and approaches to counteract these, and that some are actually deploying the strategies presented in the workshop.

The ultimate test of the workshop's effectiveness is the extent to which individual faculty members continue to recognize and self-regulate their own implicit biases, and whether changes in their individual attitudes and behaviors collectively result in more equitable hiring, retention, job satisfaction, departmental climate experiences, and advancement patterns for women in their departments. Within the next two years, we will analyze departmental recruiting and retention data for any apparent impact (e.g., a step increase in women hired) after this educational intervention is completed. We will also analyze responses to our campus-wide faculty survey to assess the influence of participation in the Bias Literacy Workshop on departmental climate.

Results thus far show that, in the four to six months after participation in the workshop, three-quarters of the interviewees not only demonstrated increased bias awareness, but described plans to change—or had actually changed—behaviors that they attributed to the workshop. These individuals could not readily name the constructs and strategies presented in the workshop; however, they could explain their characteristics and effects. The strategies most frequently employed to counteract personal bias included stereotype replacement, counterstereotype imaging, individuating, and perspective-taking. Thus, faculty appeared to be engaging in an intentional integration of bias literacy concepts in their professional lives, prerequisites to changing cultural institutional norms (Sevo and Chubin, 2008). Several statements provided evidence that departmental change could occur even with low workshop attendance as long as key individuals were present and internally motivated.

Interview comments indicated that many male faculty members felt discomfort during the workshop, regardless of where their comments placed them on the stages of change continuum. The men with the strongest negative responses were from female-dominated

departments; their comments support the backlash effect described by Rudman (1998), where social sanctions for counterstereotypical behavior help maintain cultural stereotypes (Rudman & Fairchild, 2004). Barriers to change reported by male participants ranged from explicitly denying personal bias to discomfort experienced by well-intentioned, proactive men in broaching gender issues with women. Several interviewees stated that they wanted to support women, but further comments indicated that they may unintentionally create barriers for women's advancement. Even the most well-intentioned actions may result in "benign" bias (Ryan et al., 2007). This kind of benign bias may be present in departments where attempts to ensure women and minority representation on committee work may not promote equitable solutions.

Women participants recognized that they were targets of bias, and though it made them uncomfortable, they also recognized themselves as perpetuators of bias, especially bias toward younger women. These findings are consistent with the "queen bee syndrome," wherein senior women in masculine organizational cultures who advance in their careers may dissociate themselves from their gender (Derks et al., 2011; Ellemers, 2004). Recognizing this contradiction, the women we interviewed were actively engaged in counterstereotype imaging to enhance their appreciation of these younger women as physicians and scientists.

In their study to evaluate the readiness of a state university to advance women scientists, J. M. Prochaska and colleagues (2006) identified four behavioral markers that define action for advancing women scientists: collaborating, mentoring, resource sharing, and generating support. We found elements of these career enhancement activities in our qualitative results, but also identified behaviors that limit advancement such as gender backlash in female-dominated departments, benign bias, and a reluctance by men to mentor women of childbearing age. Prochaska et al. reported that 81% of their participants were classified in the "action" or "maintenance" stages, but found no differences between men and women faculty. Our results show that while both men and women are aware of bias, their comments reflect differences in their stages of change stemming from a gendered perception of bias. Future workshops might benefit from addressing a range of responses (from defensiveness to personal guilt), thus allowing participants to identify and "normalize" their reactions. Because the IAT creates the most emotional response, workshop facilitators should be well versed in the research supporting it. Additionally, future workshops might include a discussion of "benign" bias and how it is implicitly implemented.

The self-selection of the participants is a limitation, but requiring participation could introduce backlash effects resulting in potentially greater limitations. Even though other large public research universities may be similar to UW-Madison, another limitation is that this study is located at a single site. However, the variety of departments involved in this intervention suggests that it could be disseminated to other sites with little if any change.

We found that at least one third of STEMM faculty who were invited attended a 2.5-hr Bias Literacy Workshop, that nearly all found it useful, and that 85%completed a written commitment to promoting gender equity. Analysis of our 4–6 month follow-up interviews revealed that participants experienced heightened sensitivity to bias constructs as they arose in their environments, and that individuals are willing to utilize the bias reduction strategies taught during the workshop. Our findings also illustrate the complexity of the "black box" of gender bias, and the discomfort created in some participants by the sensitive material presented in the workshop. Taken together, our success in developing and launching this workshop and the response of STEMM faculty leave us optimistic that such an educational intervention may be effective in promoting institutional change toward gender equity.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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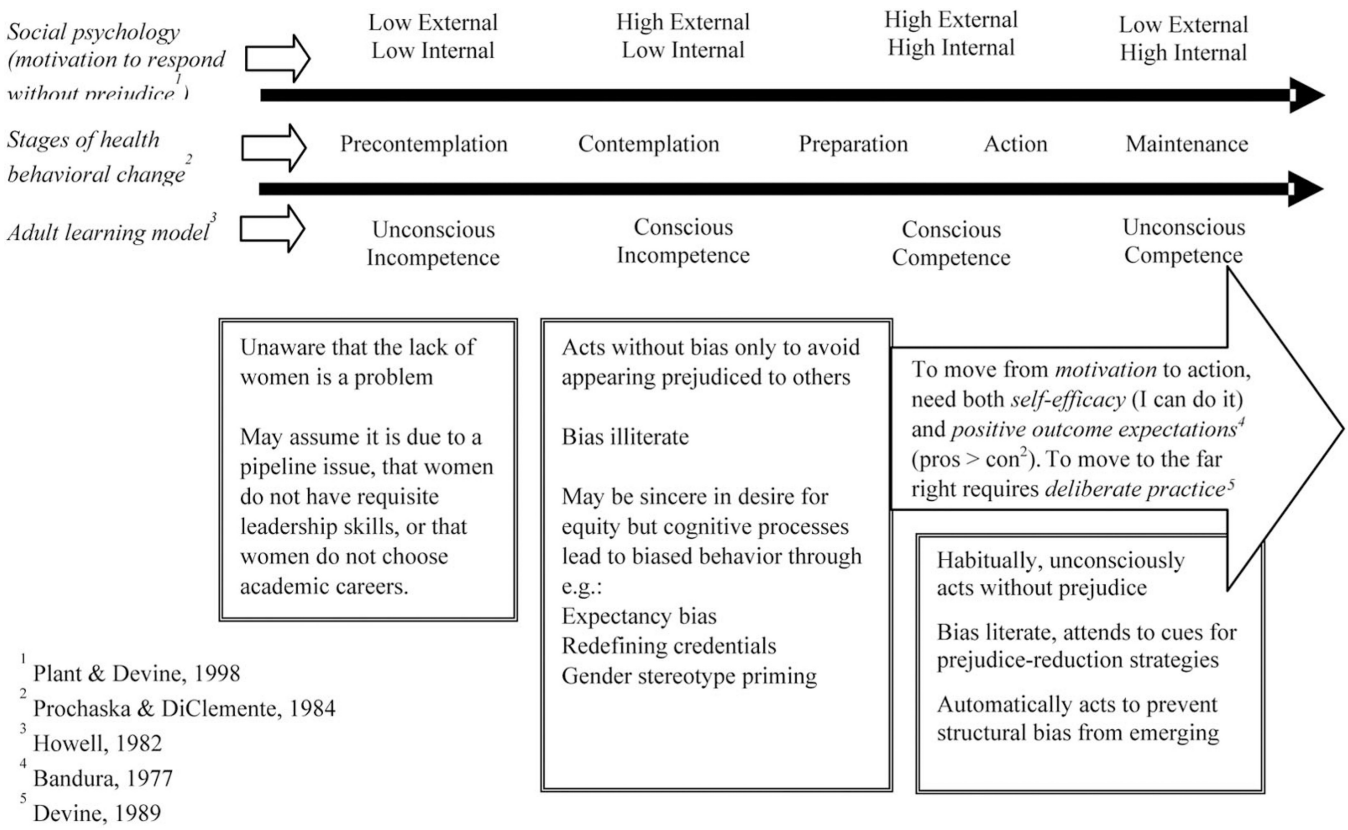

Figure 1.
Conceptual Model: Progressive movement toward habitually acting without bias.

Table 1

How the Workshop Addresses Requirements for Intentional Behavioral Change

Goal	Workshop component
Awareness and motivation: Generating recognition of a need to change and stimulating a desire to act	Participants assess their own implicit bias by taking an online Implicit Association Test for gender and leadership before the workshop.
	Presenter emphasizes the importance of gender equity in the STEMM workforce to major research bodies (e.g. NIH, NSF), highlights national economic implications, and shows local and national data.
	Paired participants identify and report back benefits of reducing gender bias in their own field or department.
	Presenter introduces implicit bias as a “habit of mind” by using optical illusions to demonstrate mismatches between reality and object perception, then extrapolating to processes by which implicit bias develops and functions in the social world.
Self-efficacy: Providing the tools to engage in a new behavior	To promote deep learning, the presenter names and describes six forms of bias reinforced with examples drawn from research studies and/or personal experiences.
	To apply and reinforce new knowledge, participants perform two case studies as readers’ theater, and in pairs, discuss and report back their discussions to the group.
	The presenter describes ineffective and effective strategies for self-regulation of implicit gender bias, supported by experimental examples.
Positive outcome expectations: Helping envision a link between action and a desired outcome	The presenter reflects on benefits articulated by participants that can come from reducing implicit bias and on the empowerment of aligning actions with personal beliefs.
	The analogy to breaking other habits is reinforced (i.e., the outcome is worth the effort).
Deliberate practice	On a two-page template, participants write a commitment to improve gender equity in their department and in their personal lives. They keep one copy and give the other to the workshop coordinator.

Table 2

Interview Guide

	Questions
1	Tell me a little about yourself and your role in your department.
2	I'd like to ask you about your participation in the Bias Literacy Workshop. What was it that made you want to attend the workshop? What, if anything, stuck in your mind from the workshop? Can you describe any time when something from the workshop entered a discussion in your department?
3	Could you describe a faculty meeting? How do decisions get made? Can you give an example?
4	How do you define gender equity?
5	We are all aware of the general stereotypes of males and females. Can you describe any ways in which you think these stereotypes might influence processes in your department? What about your own decision-making?
6	What reasons can you think of why gender equity is, or is not, a problem at the University of Wisconsin? Do you have any concerns about this?
7	How might it happen that departmental decisions are unintentionally biased against women?
8	What might mask or hide gender inequality? What do you think allows this to go unnoticed?
9	If you have behaved in a way that you recognize as biased, how did you feel about it?

Table 3

Content Knowledge Change Before and After Workshop ($N = 176$)

Concept	Knowledge before *M* (*SD*)	Knowledge after *M* (*SD*)	Increase in knowledge *M* (*SD*)	% Increasing own knowledge* %
Expectancy bias	1.4 (0.8)	2.4 (0.7)	1.1 (0.8)	77.8%
Prescriptive gender norms	1.6 (0.8)	2.4 (0.8)	0.8 (0.8)	68.6%
Role congruity/incongruity	1.4 (0.8)	2.3 (0.9)	1.0 (0.8)	72.6%
Reconstructing credentials	0.9 (0.8)	2.5 (0.5)	1.3 (0.9)	91.4%
Stereotype priming	1.3 (0.9)	2.5 (0.5)	1.5 (0.8)	80.6%
Stereotype threat	1.3 (1.0)	2.5 (0.6)	1.1 (0.9)	72.1%
Strategies for deliberate practice of non-biased behaviors	1.1 (0.9)	2.5 (0.6)	1.4 (0.9)	82.9%

Note. Knowledge is self-assessed after the workshop on a four-point scale: 0,1,2,3.

*Compared to decreasing knowledge or no change.