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Diverse Faculty in STEM Fields: Attitudes, Performance, and Fair Treatment

Lauren V. Blackwell
and Lori Anderson Snyder
University of Oklahoma

Catherine Mavriplis
University of Ottawa

In an attempt to address concerns regarding the experiences of academic faculty who are members of often-marginalized groups (e.g., women and ethnic/racial minorities), a climate survey of faculty members at a large public university was developed as part of a larger effort to improve aspects of the policies, procedures, and work climate. Multivariate analysis of variance revealed differences in performance-related variables and equality of treatment for women and racial/ethnic minorities working in the STEM (science, technology, engineering, and mathematics) fields. Women in STEM fields and racial/ethnic minority non-STEM faculty generally reported more negative experiences, while ethnically diverse STEM faculty generally reported more positive experiences. The differential composition of the racial/ethnic minority STEM and non-STEM groups is thought to explain the discrepant findings between these 2 groups.

Keywords: diversity, higher education, faculty, racial/ethnic minorities, women

A lengthy stream of research has found that the experience of women and employees who are members of racial/ethnic minority groups often differs from that of men and European White employees, and this carries over to faculty members in the academic world (Johnsrud & Sadao, 1998; Kloot, 2004; Saddler & Creamer, 2007; Swim & Stangor, 1998). For example, the performance of men in the professional and academic worlds is consistently overrated whereas the performance of women is consistently underrated by coworkers, supervisors, and even themselves (Valian, 1999). Differences may be further realized by comparing faculty who are and are not in STEM disciplines (i.e., science, technology, engineering, and mathematics). Past research has documented the underrepresentation of women and members of minority racial/ethnic groups in the STEM fields (e.g., Blickenstaff, 2005; Cota-Robles, 2000), but subjective differences in work experiences among groups have been less studied. Experiences of differential treatment may seem minor at the outset, but may accrue over time to create wide gaps between groups, leading to negative outcomes such as lower job satisfaction and higher turnover (Preston, 2006; Spector & Jex, 1998; Valian, 1999). This paper extends previous research by exploring the subjective experiences of faculty members at a large public university, specifically examining the interaction of STEM membership with gender and with racial/ethnic minority status. We hope this will serve as an update as to the status of STEM faculty from marginalized groups and provide ideas as to how universities can begin to remedy related organizational issues.

Experiences of Women and Racial/Ethnic Minority Faculty in STEM Fields

Although there have been noteworthy improvements in the percentage of racial/ethnic minority and women faculty in the STEM areas, these groups continue to be underrepresented (National Center for Education Statistics, 2001). Sonnert, Fox, and Adkins (2007) posited several reasons for this, which were originally developed in the context of gender but can easily be expanded to other marginalized

Lauren V. Blackwell and Lori Anderson Snyder, Department of Psychology, University of Oklahoma; Catherine Mavriplis, Department of Mechanical Engineering, University of Ottawa.

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Correspondence concerning this article should be addressed to Lauren V. Blackwell, Department of Psychology, University of Oklahoma, 455 W. Lindsey St., Norman, OK, 73072. E-mail: lblackwell@psychology.ou.edu

groups. Examples included societal traditions of what type of work is appropriate, the "leaky pipeline" that leads to higher rates of attrition at every level of career development, barriers in science fields such as subtle and overt discrimination, and inequitable resources and opportunities. Theorists have argued that due to the status of STEM fields as powerful institutions in our culture, they reflect and ultimately reinforce the levels of societal (in)equity (Fox, 1999). Thus, discrepancies in proportions of women and racial/ethnic minorities and in work experiences highlight underlying issues of inequity that hold the potential to harm organizations and employees. These patterns occur across STEM fields and are observed at all levels of training and career development (Nolan, Buckner, Marzabadi, & Kuck, 2008).

Individuals who are demographically different from others in the workplace may experience problems of discrimination and other negative outcomes more frequently than those that are similar to the majority of others at work. In turn, negative work experiences undermine psychological well-being (Swim, Hyers, Cohen, & Ferguson, 2001), and have been linked to increased stress and feelings of anger as well as lowered self-esteem (Crocker & Major, 1989; Feagin & Sikes, 1994; King, 2005). Challenges such as a lack of mentoring can decrease self-efficacy and negatively affect one's expectations of positive outcomes (Johnson-Bailey, Cervero, & Baugh, 2004; Nolan et al., 2008). Dissimilarity may also impact senior faculty by causing a disproportionate advising and service load due to frequently being the only faculty member of an ethnic minority group in a department (Turner & Myers, 2000; Turner, Myers, & Creswell, 1999), leaving less time for other research and teaching pursuits. A bicultural identity may be required by racial/ethnic minority faculty to enter and thrive professionally in the Western university system (Johnsrud & Sadao, 1998); they must shift between their cultural customs and those of the European White majority to interact and progress successfully in their careers, creating undue pressure and stress. Stereotype threat also has been shown to dramatically lower performance, raise stress, and diminish confidence of racial/ethnic minority members (Steele & Aronson, 1995), which also has been linked to lower performance, self-efficacy, and academic confidence in STEM fields (e.g., Bell, Sherman, Iserman, & Logel, 2003; Seymour, 1995).

In addition, women in the workplace may face particular pressure from work–family imbalance. Research has found that faculty members have resorted to strategically minimizing or hiding family commitments to avoid biased behaviors from others on the job, with women more often reporting those behaviors (Drago et al., 2006). Also contributing to this stress are expectations for women to conform to traditional gender roles (e.g., leaving to raise children and become a housewife; Blickenstaff, 2005), which many assume will naturally lead to attrition of women faculty and leave organizations less willing to invest resources in their careers. For women who attain leadership positions in STEM disciplines, perceptions of a hostile environment lead to differential retention rates than for men (Preston, 2006).

Experiences in STEM departments, such as discrimination, mentoring inaccessibility, and work–family imbalance are likely to exacerbate the challenges of workers from marginalized groups. Psychological and behavioral responses may cause women and racial/ethnic minority faculty members to lower commitment, job satisfaction, and leave the institution (Johnsrud & Rosser, 2002; Spector & Jex, 1998). Following from the above review of previous literature relevant to the experiences of women and racial/ethnic minorities in STEM fields, we propose that STEM membership and gender will interact in the prediction of workplace attitudinal, equality of treatment, and performance-related variables, such that STEM women will report the most negative work experiences. Along similar lines, we also hypothesize that STEM membership and racial/ethnic minority status will interact in the prediction of workplace attitudinal, equality of treatment, and performance-related variables, such that STEM respondents who are members of ethnic/racial minority groups will report the most negative work experiences.

Method

Participants and Procedure

An online survey was administered to the faculty of several colleges within a large public university (Carnegie Classification: RU/H, research university, high research activity). The

survey was part of a National Science Foundation (NSF) ADVANCE program (Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers; NSF, 2009) grant initiative to assess and improve aspects of the work climate, policies, and procedures at the university. Employee participation in the survey was approved by the deans of the participating colleges (including Arts and Sciences, Business, Engineering, and two other specialized STEM colleges) and the Institutional Review Board of the university. Employees were given a time window of approximately one month to complete the survey. On accessing the online survey, respondents were provided with a general study information sheet, ensuring anonymity and confidentiality. A total of 219 employees completed the survey (response rate $\approx$ 30%).

The sample was 50% STEM, 44% non-STEM, and 6% missing data. Of STEM respondents, 24.5% were women, compared to 45% of non-STEM respondents (see Table 1). For both STEM and non-STEM groups, 19% of respondents indicated being a member of a racial/ethnic minority group, closely representing the population of the colleges, which includes 18.25% members of ethnic minority groups. Eighty-five percent of respondents were full, associate, or assistant professors, whereas the other 15% were adjunct, research staff, and renewable term faculty.

Table 1
Demographic Information

	STEM	non-STEM
Total	110	96
Gender		
Men	83	52
Women	27	43
Missing	0	1
Race		
White	87	77
Asian/Pacific American	13	3
African American/Black	0	3
Hispanic/Latino/Mexican American	1	6
Native American/American Indian/Alaskan Native	2	1
Multiracial	5	5
Total racial/ethnic minority	21	18
Missing	2	2

Note. STEM = science, technology, engineering, and mathematics fields.

Measures

Several measures were adapted from items developed at other universities that received similar grants from the NSF ADVANCE program (NSF, 2009; University of Michigan ADVANCE Survey of Academic Climate and Activities, 2005; University of Rhode Island ADVANCE Academic Work Environment Survey, 2004). Traditional demographic information was gathered. College within the university, years at the university, family related variables, and STEM membership were also assessed.

For the analyses, the dependent variables (DVs) were separated into three groupings and multivariate analyses of variance (MANOVAs) were conducted on each grouping to examine the interaction of STEM membership with gender and with respondent identification as a racial/ethnic minority. The three variable groupings (i.e., attitudinal, equality of treatment, and performance-related) are detailed below.

Attitudinal Variables

Job satisfaction. A shortened form (7 items) of the measure developed by Schriesheim and Tsui (1980) assessed job satisfaction (Cronbach's α = .81). Respondents were asked to use a 5-point Likert scale from 1 (*very unsatisfied*) to 5 (*very satisfied*) to identify the extent to which they are satisfied with their work, supervisor, interpersonal relationships, and other job opportunities.

Turnover intentions. Turnover intentions were measured with a 9-item, 5-point Likert scale adapted from Hom and Griffeth (1991; α = .95). Items assessed the extent from 1 (*strongly disagree*) to 5 (*strongly agree*) to which respondents agreed with statements of "I am thinking about leaving the university" and "I intend to ask people about new job opportunities," as well as an item assessing the frequency they think about leaving the university.

Affective organizational commitment. An established subscale of a larger organizational commitment scale was used to measure affective organizational commitment (Meyer, Allen, & Smith, 1993). Six items assessed the extent to which respondents agreed (5-point Likert scale;

α = .92) to statements describing a sense of belonging and emotional attachment felt toward the university from 1 (*strongly disagree*) to 5 (*strongly agree*).

Equality of Treatment Variables

Organizational climate. This scale was also based on items that were developed for a similar grant at another university. Respondents were presented with 10 pairs of words (e.g., friendly—hostile, cooperative—competitive) and asked to choose a number (1 to 5) on the continuum to indicate the nature of the work environment in their department (α = .92). For example, 1 indicated a *friendly environment*, 3 was *neutral*, and 5 was *hostile*.

Subtle discrimination. A 20-item measure was developed for the survey based on Benokraitis and Feagin's (1986) work. The authors carefully defined and parsed out subtle discriminatory behaviors from blatant behaviors to create a descriptive outline of subtle discrimination behaviors at work. Items included "I have been included in informal social interactions at work". The response scale (5-point Likert scale from 1 (*never*) to 5 (*all the time*)) asked respondents to indicate how often they experienced these behaviors from their supervisors and colleagues, with higher scores indicating a greater frequency (α = .90).

Overt discrimination. A workplace discrimination score was generated by asking each participant to indicate if they had experienced discrimination in 10 different areas important in the professional academic arena such as salary, teaching load, promotions, and access to resources. This measure was adapted from a similar survey at another university (University of Rhode Island ADVANCE, 2004). The 10 items were then summed into a frequency score because the items are indicators of separate but related indicators of workplace overt discrimination among university faculty. Thus, the internal consistency is not the appropriate measure of scale reliability because the constructs being measured are distinct (Bollen & Lennox, 1991; Frone, 1998).

Support for family friendliness. Thirteen items asked respondents to what extent they agreed or disagreed with statements regarding how supportive the university is in matters of balancing their work and family lives based on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*); (α = .88; Thompson, Beauvais, & Lyness, 1999).

Performance-Related Variables

Research productivity. Research productivity (e.g., patents, dissertations chaired, book chapters/articles, grant proposals written/published) was assessed with 2 items based on 5-point Likert scale ranging from 1 (*much lower than*) to 5 (*much higher than*; α = .70), which asked respondents the extent to which they believed the department viewed them as productive compared to the department average, and their rank compared to colleagues of the same perceived productivity level.

Teaching involvement. Teaching involvement was a free-response item asking respondents how many courses taught in the past four semesters.

Advising. Four items asked respondent to indicate the amount of involvement with advising activities such as serving on and chairing committees. Similar to the overt discrimination and advising measures, the items were summed to create a total service score for each respondent and also were based on items from a similar survey at another university (University of Rhode Island ADVANCE, 2004).

Service. Four items asked respondent to indicate the amount of involvement with activities such as serving on and chairing committees. Similar to the overt discrimination and advising measures, the items were summed to create a total service score for each respondent and also were based on items from a similar survey at another university (University of Rhode Island ADVANCE, 2004).

Results and Discussion

STEM and Gender

MANOVAs were conducted to examine differences between men and women on the dependent variables in accordance with the first hypothesis. The multiple *F* reporting Wilks's lambda was significant for the interaction of

gender and STEM membership on the equality of treatment, $F(3, 183) = 2.79$, $p < .01$, $\eta^2 = .17$; and performance-related variable groupings, $F(3, 177) = 2.82$, $p < .01$, $\eta^2 = .21$; providing partial support for this hypothesis. Fisher's least significant difference (LSD) method (p set at $< .05$) was used to examine differences between groups for each DV. Table 2 presents relevant means and standard deviations. The MANOVA analyses for the attitudinal variable groupings did not reveal a significant effect of the interaction of STEM and gender, although means were in the expected direction so that female STEM faculty reported the lowest levels of job satisfaction and organizational commitment and the highest levels of turnover intentions.

Women reported a significantly lower equality of treatment than the men in the sample, with women in the STEM disciplines reporting the most extreme variable means. STEM women perceived the organizational climate as significantly less supportive than STEM men, and experienced a greater amount of overt discrimination compared to both STEM men and non-STEM women. In fact, 11% of STEM women reported experiencing overt discrimination in all possible discrimination categories (e.g., salary, promotion, access to resources, etc.) whereas no STEM men reported the same. Women in both groups reported a significantly lower amount of support for family friendliness than did men in both groups. Further investigation into the demographic variables also revealed that STEM women were less likely to have a spouse/partner than non-STEM women (70% vs. 84%) and men in both STEM (87%) and non-STEM fields (86%), perhaps indicating that women in scientific fields approach work–life balance differently than the other groups. This evidence suggests that women in the sciences and women in general are continuing to have more negative work experiences than male faculty members. Universities should especially note these trends in light of the fact that 59% of STEM women in the sample cited "negative climate" as the primary reason they would leave the university.

The performance-related variables also showed a number of significant differences between groups. STEM women reported the lowest levels on the variable that measured the extent to which they believed the department viewed them as productive compared to the departmental average. They also reported that when comparing themselves to colleagues of the same productivity level in their respective careers, they were at a significantly lower rank

Table 2
Means and Standard Deviations for STEM Membership by Gender Interaction

	Men				Women			
	STEM		non-STEM		STEM		non-STEM	
DV	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Equality of treatment**								
Organizational climate	3.97_{a}	0.79	$3.72_{a,b}$	1.02	3.35_{b}	0.99	$3.74_{a,b}$	0.89
Subtle discrimination	2.65	0.49	2.74	0.71	2.77	0.65	2.56	0.59
Overt discrimination	1.04_{a}	2.00	$1.93_{a,b,c}$	3.12	3.20_{c}	3.54	$1.78_{a,b}$	2.83
Support for family friendliness	3.70_{a}	0.76	3.66_{a}	0.72	3.12_{b}	0.76	3.30_{b}	0.82
Performance related**								
Productivity compared to department average, as viewed by department	3.35_{a}	1.19	3.56_{a}	1.02	2.71_{b}	1.04	3.53_{a}	0.99
Rank compared to colleagues of the same productivity level	$3.15_{a,b}$	0.83	3.37_{a}	0.91	2.79_{b}	0.93	2.97_{b}	0.72
No. of classes taught	5.47_{a}	2.80	$6.02_{a,b}$	2.61	$5.37_{a,b}$	2.24	6.76_{b}	3.39
No. of students officially advised	15.40_{a}	19.90	10.17_{a}	13.40	$17.90_{a,b}$	15.10	32.20_{b}	66.70
Service	3.84_{a}	2.07	$4.52_{a,b}$	2.78	5.33_{b}	3.71	$4.41_{a,b}$	2.48

Note. For dependent variable (DV) groupings' overall multivariate analysis of variance significance level, $^{**}p < .01$. Means within a row with different subscripts differ significantly at $p < .05$, as indicated by the Fisher's least significant difference procedure. See the Measures section for an explanation of each scale. STEM = science, technology, engineering, and mathematics.

than non-STEM men. This suggests that women, especially in the sciences, feel undervalued by other members in their department when considering research productivity. Previous research has similarly found that the average academic status of women in science fields is nearly one full rank below that of their male counterparts, although differences in age may partially explain this result (Sonnet, 1995). STEM women reported low levels of teaching but also indicated significantly higher levels of service involvement than STEM men, supporting research reporting a larger number of hours per week in service to public or professional organizations by women than men (Jackson, 2004). Unfortunately, service activities such as participating in committees are largely viewed as a minimal requirement during the promotion process, whereas publications or grants are considered more valuable and reward-worthy activities at most large universities (Porter, 2007).

STEM and Racial/Ethnic Minority Identification

Due to the small sample of non-White respondents, statistical analyses comparing each ethnic/racial group to others was not feasible given the available power. For this reason, all participants identifying in a group other than the majority group (i.e., White) were summed to create an overarching racial/ethnic minority group. This dichotomous variable crossed with STEM membership produced four groups (i.e., racial/ethnic minority STEM respondents, racial/ethnic minority non-STEM respondents, racial/ethnic majority STEM respondents, racial/ethnic majority non-STEM respondents).

MANOVAs were again conducted to examine differences between groups in the three sets of DVs in accordance with the second hypothesis. Fisher's LSD method was employed to explore differences across groups (see Table 3). A pattern of results similar to that of the gender by STEM membership analyses emerged for racial/ethnic minority identification by STEM membership, providing partial support for this hypothesis. The multiple F reporting Wilks's lambda was significant for the interaction of racial/ethnic minority identification and STEM membership on the equality of treatment, $F(3, 185) = 1.75$, $p = .05$, $\eta^2 = .11$; and significant for performance-related variable groupings, $F(3, 180) = 2.24$, $p < .01$, $\eta^2 = .17$. No significant differences were detected for the attitudinal variables, although STEM faculty from ethnic minority groups reported the most positive attitudes, while ethnically diverse non-

Table 3
Means and Standard Deviations for STEM Membership by Racial/Ethnic Minority Interaction

	Racial/ethnic minority respondent				Racial/ethnic majority respondent			
	STEM		non-STEM		STEM		non-STEM	
DV	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Equality of treatment*								
Organizational climate	$3.76_{a,b}$	1.05	3.28_{a}	0.99	3.83_{b}	0.84	3.83_{b}	0.93
Subtle discrimination	$2.74_{a,b}$	0.54	3.11_{a}	0.76	2.65_{b}	0.53	2.56_{b}	0.60
Overt discrimination	1.40_{a}	3.06	4.06_{b}	3.56	1.63_{a}	2.52	1.35_{a}	2.60
Support for family friendliness	3.38	0.85	3.46	0.98	3.60	0.78	3.51	0.74
Performance related**								
Productivity compared to department average, as viewed by department	3.68_{a}	1.20	$3.20_{a,b}$	1.15	3.09_{b}	1.16	3.63_{a}	0.97
Rank compared to colleagues of the same productivity level	$3.37_{a,b}$	0.90	3.73_{a}	1.22	3.00_{b}	0.85	3.09_{b}	0.71
No. of classes taught	4.31_{a}	3.00	6.60_{b}	3.41	$5.69_{a,b}$	2.52	6.27_{b}	2.87
No. of students officially advised	13.70	16.30	14.10	20.00	16.70	19.50	20.50	49.10
Service	4.58	4.11	4.53	2.77	4.15	2.14	4.46	2.63

Note. For dependent variable (DV) groupings' overall multivariate analysis of variance significance level, $^{*}p < .05$, $^{**}p < .01$. Means within a row with different subscripts differ significantly at $p < .05$, as indicated by the Fisher's least significant difference procedure. See the Measures section for an explanation of each scale. STEM = science, technology, engineering, and mathematics.

STEM faculty reported the most negative attitudes.

A caveat to the observations reported here: The ethnic/racial composition of the STEM respondents is notably different than the non-STEM respondents. The largest component of racial/ethnic minority STEM respondents identified as "Asian/Pacific American" (62%), a group that may report more positive work experiences than other traditionally marginalized groups (Saddler & Creamer, 2007). Note there were no African American/Black STEM respondents, although university records indicate the presence of two African American STEM faculty members.

For equality of treatment variables, there were significant differences between groups on both subtle and over discrimination. Non-STEM respondents of ethnically diverse groups reported a significantly less supportive climate than STEM and non-STEM majority respondents. Non-STEM racial/ethnic minority respondents also indicated a higher level of subtle discrimination than both groups of White respondents and a higher level of experienced overt discrimination than any other group.

Ethnically diverse STEM respondents indicated their productivity was viewed significantly more positively by the department in comparison with majority STEM respondents. Racial/ethnic minority STEM respondents also reported greater scores than both majority groups on the variable assessing rank as compared to colleagues of the same level. Results suggest that being a racial/ethnic minority (largely Asian/Pacific American in this sample) in a STEM area may be associated with a more positive work experience. An examination of group means when splitting the STEM group into White, Asian/Pacific American, and non-Asian racial/ethnic minority groups, revealed that Asian STEM respondents had the highest reported satisfaction and climate perceptions, and lowest turnover intentions, and overt and subtle discrimination. It is likely that substantial differences in the racial/ethnic make-up of STEM and non-STEM groups impact the discrepant results between the groups. The non-STEM racial/ethnic minority respondents are composed mainly of African American/Black and Hispanic/Latino/Mexican American respondents, groups that are more traditionally marginalized in the American culture. The results support previous research, which found that Asian/Pacific American faculty members report higher job satisfaction than any other racial/ethnic minority groups (e.g., Saddler & Creamer, 2007; Tack & Patitu, 1992). Similarly, Li (1994) found that Asian minorities in more balanced work groups had higher levels of performance and self-efficacy than individuals who were sole members of their respective groups. The larger representation of Asian/Pacific Americans in the STEM fields may benefit this group overall by creating a situation of greater demographic similarity, which has been found to lead to favorable work attitudes and behaviors (Riordan, 2000). Other possible explanations for the STEM racial/ethnic minority group's results is a cultural value in nonaggressive communication style, which includes deference to authority, or treatment of Asian/Pacific American employees by other workers in accordance with the view that they are "model minorities" (Johnsrud & Sadao, 1998). This may create a situation in which members of this racial/ethnic group experience less discrimination than members of other racial/ethnic minority groups, leading to better work experiences.

Limitations

Because the number of respondents in specific racial categories was small, more thorough comparison across specific racial groups is limited by having few or no members of some ethnic groups represented in STEM (notably, no African American/Black respondents). Future research should address this limitation by seeking out a more diversified sample of faculty members to increase the *n* size in every cell, and if possible, examine groups beyond simply White versus non-White comparisons. However, the generally low numbers of STEM faculty from many racial groups across the workforce makes this effort difficult. The examination of a single university also may limit the generalizability of the results until replication can occur, given possible effects of climate, policies, and leadership. Cross-sectional survey methods limit the research questions that may be answered. Longitudinal research may provide more answers as to how work experiences change over time within a person's tenure at a university and over the length of a career. A

follow-up survey is scheduled to be conducted 2 years after the close of the reported survey to address these issues, which is supported by scholars arguing for the long-term monitoring of the impact of policy strategies to determine progress (Marschke, Laursen, Nielsen, & Rankin, 2007).

Practical Implications

Previous researchers have stated the benefits of diversity in higher education settings and argue that the full representation and participation of racial/ethnic minority faculty in the academy is essential to creating diverse colleges and universities (e.g., Milem & Hakuta, 2000; Turner & Myers, 2000). Recently, several higher education leaders testified before Congress about the continuing underrepresentation of women in tenured faculty positions in science and engineering (Hermes, 2007). Proposals included the creation of an National Collegiate Athletic Association-style organization to monitor the hiring practices of academic departments and urge compliance with federal laws prohibiting gender discrimination. Substantial change likely requires action at the national level as well as the university and departmental level to combat continued negative experiences of marginalized university faculty. It is also necessary to combat hostile work environments that contribute to a higher proportion of women than men leaving organizations (Preston, 2006).

The NSF has made many efforts to assess and improve the experiences of faculty members belonging to these traditionally marginalized groups by funding a series of NSF ADVANCE grants, of which this project is a part. Our findings optimistically indicate that racial/ethnic minorities in STEM fields are reporting more positive work experiences, but this may be a result of those fields excluding traditionally marginalized groups who may perceive the same work environment to be more negative than the largely Asian/Pacific American sample. Although our work contributes needed research to the area of Asian/Pacific American work experiences, further examination into experiences of STEM respondents from other racial/ethnic groups and at other universities is warranted.

The results of this study also further demonstrate the challenges faced by women in STEM disciplines. Women in STEM fields indicated participation in a higher level of service than men, possibly due to the perceived need to include women on a variety of committees, which causes greater demand for this population. STEM women on average reported experiencing discrimination in more than three realms of work life, and three of 27 women perceived discrimination in all 10 possible areas. Although conclusions about these results should be tempered by the small size of this sample, these findings indicate that women in STEM fields perceive their work environments as somewhat hostile and view the actions of others to be unfair toward them.

We found it interesting that significant differences were not detected in attitudinal variables by gender or racial/ethnic minority status and STEM field, although women generally reported more negative attitudes and Asian/Pacific Americans the most positive attitudes. This finding somewhat corresponds to results of Saddler and Creamer (2007), who identified greater differences between groups for organizational climate than job satisfaction in a sample of university faculty. Future research may explore additional factors that compensate for negative work experiences in determining attitudinal responses of women and racial/ethnic minorities.

The results of the current study may be combined with those of previous ADVANCE grant surveys of faculty at other large universities to generate practical suggestions for bettering the work experiences for members of targeted groups. For example, the improvements made by the ADVANCE program at the University of Michigan has increased the number of women hired annually for science and engineering faculty positions threefold over a 5-year period ("Bridging the Gender Gap," 2006). In accordance with the current findings, scholars suggest intervening at multiple points to succeed, which includes addressing early issues of training and education of marginalized groups (Marshke et al., 2007). Successful recruiting and hiring of marginalized group members can be achieved through a proactive recruitment program to reach out to these groups, providing job descriptions containing an educational or scholarly link to the study of race/ethnicity or criterion for experience in working with diverse groups, creating a diverse applicant pool, and

establishing consensus in hiring committees early on (Mahtani, 2004; Marschke et al., 2007; Smith, Turner, Osei-Kofi, & Richards, 2004). Actions also can be taken once applicants from marginalized groups have been hired, including nominating a change agent to provide support and encouragement; creating more transparent organizational processes and structures; creating family friendly policies and programs such as daycare, leave time, and family health care benefits; creating networking opportunities; and clarifying policies regarding harassment, promotion/rewards, and mentoring (Kloot, 2004; Marschke et al., 2007; Sonnet, 1995).

In a symposium at the 2008 Association for Psychological Science meeting, researcher Diane Halpern concluded that "there is no single or simple answer [to the issue of inequity in the STEM fields]" (Wargo, 2008, p. 45), and several factors (e.g., policy, cultural context, experiences) interact in complex ways. It is hoped that the information contained in this research will further our understanding of the university's work climate and serve to justify recommended changes to the university's administration and provide information to other universities to apply to future examinations of climate perceptions. Other organizations outside a university setting, especially in STEM-related industries, may also benefit from considering the findings of this line of research and modeling policies after suggestions of those in academia. In the ever-advancing world of science and technology, diversity and equality can create an atmosphere conducive to collaborative gains in knowledge and valuable application of research efforts.

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