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Surveying the Campus Climate for Faculty: A comparison of the assessments of STEM and non-STEM faculty

Dana M. Britton, Chardie L. Baird, Ruth A. Dyer, B. Jan Middendorf, Beth A. Montelone, Christa Smith

Kansas State University

ABSTRACT
A fundamental assumption of programs intended to increase the numbers of women faculty in science, engineering and math (STEM) has been that women in these disciplines experience a uniquely hostile climate. While this focus on STEM faculty is necessary and important, we argue that it may be too narrow. In this paper, we compare STEM to non-STEM faculty, drawing on a representative survey of university faculty in one institution (N=612) conducted in 2007. Our findings indicate that non-white men in the STEM disciplines are in fact significantly less satisfied than white men in these fields and less satisfied than their counterparts in non-STEM fields. Among white women, those in STEM fields are significantly less satisfied than those in non-STEM disciplines. These differences are largely mediated by perceptions of work and contextual factors, however. With a few exceptions, we find that the factors that predict satisfaction are the same across groups of faculty. This implies that efforts to improve university and departmental climates will benefit all faculty.

KEYWORDS
STEM faculty; job satisfaction; career progress satisfaction; gender; race/ethnicity

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INTRODUCTION

A fundamental assumption of programs like National Science Foundation's (NSF) ADVANCE awards and other initiatives intended to increase the numbers of women faculty in science, engineering and math (STEM) is that women in these disciplines experience a uniquely hostile climate, one deeply shaped by power structures in male-dominated departments and gendered assumptions and practices that shape work in STEM disciplines.

This focus on STEM faculty is necessary and important; there is no question that the numbers of women in many of these disciplines has historically been very low. However, we argue that this focus may be too narrow for two reasons. First, programs and research that focus only on the STEM disciplines implicitly assume that women have achieved equality, or at least that their working conditions are far more tolerable, in other disciplines in which they are more highly represented. This is an empirical question that has received comparatively little attention. And second, this focus ignores the value of comparisons across disciplines in which women are more and less well represented. If one wishes to understand how to improve climates for women and increase their numbers, one would benefit from examining the climate and practices of disciplines in which this has already presumably been accomplished.

An explicit comparison between STEM and non-STEM faculty has rarely been made in a systematic way, however. We do so in this paper, drawing on results from a representative survey, conducted in 2007, of university faculty in one institution (N=612). Broadly speaking, we investigate whether faculty perceptions of satisfaction with work vary systematically between STEM and other disciplines, whether women in STEM disciplines in particular are less satisfied, and what factors predict perceptions of satisfaction and success for faculty in general.

LITERATURE AND BACKGROUND

The policy-oriented literature on women in academic STEM offers two rationales for focusing resources on ameliorating gender inequities in these fields. The first is that physical and life scientists and engineers are more important, in the sense of national and social well being, than academics from other, "softer" disciplines. One can find this sentiment in almost any policy report on the demography of the STEM workforce. For example Shirley Jackson, President of Rensselaer Polytechnic Institute, writes: "If we engage the talent — with its beauty and the beautiful minds — of all of our young people in science and engineering studies and professions — we will address our national self-interest" (quoted in Nelson et al., 2007: 5). It is not our intention to test this assumption here, and indeed it would be difficult to do so.

The second assumption is that women in STEM disciplines face a more hostile climate and higher barriers to advancement than women in other disciplines, for example, in the social sciences. Indeed a number of studies have documented exclusionary cultures and biased policies and practices in STEM disciplines such as engineering (Callister, 2006; Miller, 2002), the physical sciences (Nelson and Rogers, 2004; Rosser, 2002), the life sciences (Xie and Shauman, 2003), and computer science (Misa 2010, Peterson 2010). Some women leave these fields entirely, while those who remain advance more slowly than their male peers (Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2006). The narrow focus of these studies makes it difficult to determine whether these conditions are unique to women in STEM disciplines or whether they are more dissatisfied than their counterparts in other fields. This assumption – that the climate is uniquely hostile for women in STEM fields - is empirically testable, and we offer a preliminary test in this paper.

As a reference point for what follows, it is useful to compare the representation of women and men across academic fields. Data collected by Nelson et al. (2007) track the representation of women across academic fields and ranks in the top 100 departments in the US. Table 1 displays some of these data. The second column in the table is the percentage of women receiving PhDs in a particular field in the period from 1996-2005. The next set of columns indicates the percentage of women among faculty at particular ranks and in the discipline as a whole. The final set of columns is the gap between the number of women in the pool of PhD graduates and the representation of women at different ranks. Negative numbers mean that women are underrepresented (e.g., in Chemistry women are 32.4% of the pool, yet 21.2% of assistant professors, for a gap of -11.2 percentage points); positive numbers indicate that women are overrepresented relative to their representation in the pool.

As Table 1 indicates, women are underrepresented as faculty in all but one of the disciplines listed, and this underrepresentation is particularly severe at the full professor rank. Interestingly enough, however, these data show that those disciplines in which the underrepresentation of women on the faculty as a whole (relative to their availability in the PhD pool) is highest are in the social and biological sciences. Psychology has the largest gap, at -30.5 percentage points (i.e., 67.8% of those in the PhD pool over the period 1996-2005 were women, but women held only 37.3% of faculty positions in Psychology in 2007), followed by the Biological Sciences and Sociology. The same pattern holds at the full professor rank. Psychology is in fact the only discipline to in which women are underrepresented by more than fifteen percentage points across the board, and Sociology and the Biological Sciences (the science discipline often considered the most hospitable for women) are the only two fields for which this is true at every level beyond assistant professor. It is also the case that these are the three fields in which the proportion of women PhD graduates is highest. But even at the assistant professor level, there is a gap in Psychology of almost -20 points, -11 points in Biological sciences (essentially the same as Chemistry).

On the other hand the fields in which we are starting to see overrepresentation of women are all in the sciences and engineering. In Mechanical Engineering, for example, women are overrepresented by almost ten percentage points at the assistant professor level. We do not mean to imply that equality has been achieved in these disciplines, and the numbers of women are still very small (indeed, women earned only 8.4% of PhDs in Mechanical Engineering from 1995-2005). It may be that programs like ADVANCE are beginning to have an impact, however. It may also be, as a recent report has suggested (Committee on Gender Differences in the Careers of Science, Engineering, and Mathematics Faculty et al., 2010) that women in fields like Biology and Chemistry are simply less likely to apply for academic jobs than women in engineering disciplines. The same may be true in Psychology, in which there are many non-academic positions for those with PhDs. Regardless, these data demonstrate that the situation around gender equity is more complex than those who argue that women face unique difficulties in STEM disciplines claim.

UNIVERSITIES AS GENDERED ORGANIZATIONS

We argue that the factors that produce gender inequities among faculty are likely to exist at all levels of the university – in their policies and practices, their cultures, their leadership, among academic departments, and between individual faculty members. The general theoretical model guiding our approach is the theory of gendered organizations (Acker, 1990, 1992a, 1992b; Britton, 2000, 2003; Britton and Logan, 2008). This theory argues that organizational policies and practices, cultures, interactions, and workers' own identities are based on normative assumptions about gender that generally advantage men and can work together to reproduce gender inequality. As all faculty work in gendered organizations, to some degree gender inequality should shape their experiences regardless of institution, discipline, or rank.

There are several reasons to expect that this should be the case. Historically, universities emerged as deeply gendered organizations, originally dedicated to the education of young men, and with men as their only faculty. Over the course of the 20th century, and particularly during the period after World War II, women's representation as faculty members grew, as did women's share of the student body (Bird 2011). As Table 1 indicates however, women remain segregated across disciplines, and as other studies have shown (see for example Bach and Perucci, 1984; Jacobs, 1996; Konrad and Pfeffer, 1991; Rajeswaren, 2000; Kulis and Miller-Loessi, 1992a; Kulis and Miller-Loessi, 1992b), they are more likely than men to be found in the least prestigious institutions.

University cultures remain masculinized. In most colleges and universities, for example, leadership at all levels is male-dominated. Table 1 provides evidence for this at the full professor rank, and statistics collected by the American Council on Education (King and Gomez, 2008) indicate that women are only 23% of university Presidents, 38% of Provosts, and 36% of academic deans. Within departments, women are less likely than men to have access to departmental leadership positions and assignments to powerful committees (Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2006).

So too does the structure of the academic career reflect men's lives more than women's. The notion of the "ideal" academic (Acker, 1990; Williams, 2001) typically includes the requirement that anyone who fills this position will prioritize working long hours at the expense of a life outside of work. As women remain disproportionately responsible for the care of young children, they are disproportionately disadvantaged in their attempts to live up to this notion. But any of those who provide care, men or women, find that they struggle to balance the demands of an academic career with those of family.

Departmental structures and practices across the university also reflect and reproduce gendered inequalities. Assignments within departments often vary systematically for men and women faculty – women may be assigned more service roles, while men may have higher visibility roles in leadership and research (Acker, 2007; Bird, Litt and Wang, 2004; Bird, 2011; Misra et al., 2011). Women may be less likely to have access to mentors, and hence to have access to informal networks that communicate the norms and provide the connections necessary for success (Olsen, Maple and Stage, 1995; Smith and Calasanti 2007). Unclear expectations for tenure and promotion may also disproportionately disadvantage women (Bird, 2011; Fox and Xiao, 2012), in part also due to their lack of access to informal information networks.

However, while there are reasons to expect that women faculty in general are disadvantaged by the gendered structures and practices of the university, there are also – as advocates for programs like NSF ADVANCE claim - reasons to expect that the situation should be uniquely difficult for women in STEM disciplines. As Table 1 indicates, these are often the most male dominated of the disciplines, and also those in which men are most likely to dominate at the rank of full professor (e.g., men are 96% of full professors in mechanical engineering, but 71% of full professors in psychology).

Similarly, the structure of academic work in the sciences – the long hours in the laboratory, the overwhelming emphasis on producing grant funding for one's work, may burden women in the sciences disproportionately as opposed to those in other disciplines. Women STEM faculty are also uniquely disadvantaged by expectations about the connections between gender and competence in these disciplines. Cultural gender beliefs about men and women associate men far more with scientific and technical competence, and women who succeed in STEM fields must contend with the assumptions of their colleagues and students that women are simply less skilled than men in these fields (Baird, 2012; Ridgeway, 2009, 2011; Ridgeway and Correll 2004).

		Faculty % women, FY 2007, Top 100 Departments				Percentage point gaps by rank			
	Ph.D % women, 1996-2005	Assistant	Associate	Full Professor	All	Assistant	Associate	Full Professor	All
Chemistry	32.4	21.2	19.6	9.7	13.7	-11.2	-12.8	-22.7	-18.7
Math	28.7	26.8	18.4	7.1	12.9	-1.9	-10.3	-21.6	-15.8
Computer Science	21.2	20	11.6	10.3	13.2	-1.2	-9.6	-10.9	-8
Physics	14.3	16.8	13.4	6.1	9.1	2.5	-0.9	-8.2	-5.2
Biological sciences	46.3	35	30	17.4	24.4	-11.3	-16.3	-28.9	-21.9
Chemical Engineering	23.7	24.2	17.6	7.3	12.6	0.5	-6.1	-16.4	-11.1
Civil Engineering	22	24.7	14.5	7.1	13	2.7	-7.5	-14.9	-9
Electrical Engineering	12.3	15.5	12.5	5.7	9.5	3.2	0.2	-6.6	-2.8
Mechanical Engineering	8.4	18	11.9	4.4	8.8	9.6	3.5	-4	0.4
Economics	30.2	30.8	20.3	8.7	16.3	0.6	-9.9	-21.5	-13.9
Political Science	38.9	37	29.3	17.6	26.1	-1.9	-9.6	-21.3	-12.8
Sociology	60.8	56.1	45.7	28.2	39.8	-4.7	-15.1	-32.6	-21
Psychology	67.8	48.5	43.9	29.5	37.3	-19.3	-23.9	-38.3	-30.5

Table 1. Distribution of women faculty, by discipline

EMPIRICAL IMPLICATIONS

In this study, we will compare attitudes about work, in particular job satisfaction, between groups of STEM and non-STEM faculty. As the literature suggests, we are left with two somewhat different accounts – it could be that gendered university structures will lead to lower satisfaction for women faculty regardless of discipline, or it could be that women in the non-STEM group will be far more satisfied with their work than their counterparts in STEM disciplines.

There is a considerable empirical work on job satisfaction. The findings of this line of research, which has been conducted with workers in a broad range of occupations, have implications for what we might expect to find among faculty. At the level of the individual, norms, perceptions and beliefs matter in shaping attitudes about one's work, regardless of the workplace. Generally speaking, research finds that the nature of the work is the most important determinant of satisfaction - for example, a sense that one is challenged, has autonomy, does interesting work, is a valued member of an organization, and has good relationships with one's coworkers and supervisors lead to feeling more satisfied (for a review, see Saari and Judge, 2004). Similarly, the extent to which one feels stress, for example, work-related stress (Britton, 1997), or strain due to the contradictory demands of work and family, also affects satisfaction with one's work (Hochschild, 2001). There is no reason to think that the factors that produce satisfaction with work would differ for STEM and non-STEM faculty, but we explore that question in our analysis.

Gender also matters in shaping perceptions of one's work, though in complicated ways. Strictly speaking, very few researchers argue that gender, as a discrete characteristic, influences job satisfaction. Women are not inherently less satisfied with their work just by virtue of being women. Instead their experiences and structural positions combine to create lower levels of satisfaction. As Kanter (1977) convincingly demonstrated more than thirty years ago, women's disproportionate representation in low status, low visibility positions with little authority fundamentally shapes their attitudes about work and the reactions of others to women (or men) in such positions. Hence we would expect that women's dissatisfaction with work would be mediated by features of their work and the organizations in which it is performed. Again, there is no reason to think that this would vary for STEM versus non-STEM women, but we will test that assumption.

Finally, there is some evidence in the research literature that women (in particular, white women – for example see Britton, 1997) report higher levels of satisfaction with work, even controlling for objective job characteristics and subjective perceptions of aspects of their work (Hodson, 1989). Researchers are divided about why this might be, but some argue that women's reference group differs from men's in thinking about job satisfaction; men compare their current work to other work they have had or to some ideal job, women compare their paid work to the conditions of unpaid work at home and thus always report higher levels of satisfaction with paid work. We cannot test this assumption, but it is worth remembering that tests of the differences in job satisfaction between men and women will always be conservative because of the background effect of women's generally higher levels of satisfaction.

In the analysis that follows, we examine the job and career satisfaction of a representative sample of faculty at one university. We first ask whether STEM and non-STEM faculty differ in overall levels of satisfaction with work, and then we look at the factors that produce satisfaction for STEM and non-STEM faculty. Our analysis demonstrates that the problem of gender inequity in the university is more likely due to generalized policies, practices, and experiences than any constellation of factors unique to the STEM disciplines.

HYPOTHESES

The literature on women's experiences in academic STEM suggests the following hypotheses.
1. Women in STEM departments will be less satisfied with their jobs than women in non-STEM departments.
2. The effects of sex on job satisfaction will be mediated by attitudes about work and by the contexts of work.
And though the literature does not explicitly suggest this, a third hypothesis is implied by a policy and research focus on STEM faculty to the exclusion of others:
3. The predictors of job satisfaction will differ for STEM versus non-STEM faculty.

METHODOLOGY

Sample

The data come from a campus climate survey conducted at Kansas State University (KSU). KSU is a land-grant university in the Midwest with a total student enrollment of approximately 23,000 which offers a full array of the usual graduate and undergraduate offerings in the natural, physical, and social sciences, liberal arts, and engineering. Because of the land grant mission of the institution (which requires that the University support rural communities in the state) KSU also houses a College of Agriculture and a College of Veterinary Medicine. This mix of disciplines means that the student body is slightly more male-dominated than at a typical liberal arts institution in the U.S. (e.g., men were 52% of undergraduates in 2007).

A total of 612 KSU faculty responded to the 2007 K-State Community and Climate Survey, for a 48.5% response rate. Respondent demographics were similar to the KSU faculty population by sex, race, tenure status, and in the distribution by College. The distribution by race and sex is: white men, 55 percent, white women, 30 percent, non-white men, 9 percent, and non-white women, 4 percent (there were a small number of faculty with missing race/sex data). Because of the size of this final group, any findings about non-white women should be viewed with some caution.

The survey addressed a wide range of areas, from overall satisfaction with the job, satisfaction with the tenure and hiring processes, workload, department climate, perceptions of discrimination and efforts to increase faculty diversity, and success in balancing work and family. The survey was administered to faculty online; they were given an anonymous access code and could complete it at a time and place of their convenience. Ninety-four percent of those who began the survey ultimately completed it. Our final sample size is n=407 once we exclude missing values on all variables in the analysis.

Measures

Dependent variable

Job satisfaction. Respondents were asked their level of agreement with the statement "I am satisfied with my job at the university". The response categories range from "strongly disagree" (coded 1) to "strongly agree" (coded 5).

Independent variables

Perceptions of work. We created seven measures of work perceptions from the data. These are additive scales created using factor analysis: experiencing satisfaction with the financial aspects of the hiring process, experiencing satisfaction with the qualitative aspects of the hiring process, feeling valued and respected in one's department, experiencing work spilling over into family life, experiencing family life spilling over into work, experiencing the department and university as supportive of work/family balance, and witnessing discrimination. The response options for all of the items except feeling valued and respected in one's department and the perception of discrimination range from strongly agree (coded 1) to strongly disagree (coded 5) and include a neutral option as a middle value. The response options for feeling respected and witnessing discrimination range from never (coded 0) to always (coded 4). Appendix A provides the items used, the minimum values, the maximum values, and the reliability scores for each scale.

Department Context. We measure four aspects of departmental context: whether one has had a mentor, teaching load, research load, and advising load. To measure mentoring, we use a dichotomous variable coded 1 if respondents answered "yes" when asked "Have you had or do you currently have individuals at this university who assist you in your career development?" The measures of teaching, research, and advising loads are relative to other members of respondents' departments. We created a dichotomous variable to capture whether respondents' feel that their loads in each of the respective areas are more than their colleagues'. The reference category is comprised of those who felt their loads in these areas were equal to or less than their colleagues. Respondents could also report that the respective loads aspect (teaching, research, advising did not apply to their appointment. We use these measures as control variables in the analyses.

Socio-demographics. Though the focus of our analysis is gender, we created a series of three dichotomous variables to ease interpretation of sex and race interactions: white women, non-white men, and non-white women. The reference category is white men; they are the largest group in the sample, and arguably university structures and practices best reflect their preferences and experiences. All results for these variables should be interpreted as a comparison of the designated group to white men. Due to sample size and confidentiality concerns, we cannot break the non-white men and women categories into more specific groups; it is worth noting that most of the non-white faculty in our sample are

Asian, however. We employ this approach primarily because of the composition of our sample. Given the proportion of white faculty in the sample and the predominance of men in the non-white category, dichotomous variables for sex and race would primarily capture the experiences of dominant groups in each category – i.e., a dummy variable for women would capture effects for white women, and a dummy variable for non-white faculty would primarily capture effects for non-white men.

Programs like ADVANCE have also, until recently, focused primarily on improving campus climates for women; there has been little emphasis on under-represented minorities in STEM. Yet we know that women and men faculty of color – particularly Hispanic and African-Americans – are even more underrepresented in STEM disciplines than white women. Nelson et al. (2007) find that that few of the top 100 science and engineering departments have more than one faculty member from an underrepresented minority group (defined as African-American, Hispanic, and Native American). The problems faculty members from these groups report are not specific to the STEM disciplines, and include isolation, being overloaded with service and advising obligations, and a hostile working environment (Witt and Calasanti, 2007; for a review, see Nelson et al., 2007). Our dummy variables should allow us to shed light on the intersections of race and sex in faculty perceptions of work.

We created a dichotomous variable coded 1 if faculty are tenured to control for the likelihood that tenured faculty are more satisfied with their jobs and careers than untenured faculty. We also include a dichotomous variable coded 1 if the respondent is a department head to control for the likelihood that their job satisfaction is likely to be different from faculty members.

Analysis

To test hypothesis 1, we regress job satisfaction on socio-demographic variables using OLS regression. To test hypotheses 2 and 3, we add perceptions of work measures and departmental context to the regression analyses.

RESULTS

Table 2 presents the descriptive statistics for all the variables used in the analyses. Columns 1 and 2 report the descriptive statistics for individuals in the STEM disciplines and columns 3 and 4 report the results for non-STEM faculty. The final column presents the results of tests for the differences in means and percentages by discipline. For ease of interpretation in this table, we have divided the values of the additive scales by the number of items in each scale. The descriptive statistics indicate that there are some differences between STEM and non-STEM faculty. Both STEM and non-STEM faculty report moderate to high levels of overall job satisfaction (3.78 and 3.67 on a scale from 1 to 5). In analyses not shown, we examined sex/race differences in job satisfaction within and across disciplines. Among non-STEM faculty, white women were the most satisfied with their jobs (3.94) and non-white women were least satisfied (3.17). Among STEM faculty, white men and white women were the most satisfied (3.93) and non-white men were the least satisfied (2.88).

Measures	STEM Mean	STEM Percent	Not STEM Mean	Not STEM Percent	STEM Diff. Signif.
Job Satisfaction	3.78		3.67		
Perceptions of Work					
Hiring, financial (max=5)	3.38		3.33		
Hiring, qualitative (max=5)	4.13		4.12		
Respected (max=4)	3.01		3.07		
Work spillover (max=5)	2.71		2.69		
Family spillover (max=5)	2.51		2.52		
Dept. balance (max=5)	3.18		3.29		
Discrimination (max=4)	.54		.67		
Contextual Variables					
Mentor		51.6%		54.5%	
Teaching, more		31.8%		30.6%	
Advising, more		16.5%		22.0%	
Research, more		24.5%		16.9%	*
Socio-demographics					
White woman		18.2%		40.4%	***
Non-white man		11.6%		7.5%	*
Non-white woman		3.2%		5.3%	
Tenured		68.4%		60.5%	*
Department head		4.6%		5.3%	
Teaching, na		17.5%		14.3%	
Advising, na		24.7%		24.5%	
Research, na		12.6%		18.8%	*

Notes: *** $p < .001$, ** $p < .01$, * $p < .05$

Table 2. Descriptive Statistics by STEM Status, KSU Climate Survey, 2007

There are no significant differences in the means for any of these items. Both STEM and non-STEM faculty report moderate to high levels of satisfaction with the financial and qualitative aspects of their hiring processes. In addition, both STEM and non-STEM faculty feel respected by their departments and think their departments and the university is mostly supportive of work/family balance. STEM and non-STEM faculty perceive essentially equal amounts of work and family spillover as well as discrimination. There are some discipline differences in context and socio-demographics, however. STEM faculty are significantly more likely than non-STEM faculty to report that they have higher research obligations than their colleagues; there are no differences between the groups on perceptions of teaching and advising loads. STEM and non-STEM faculty are equally likely to report having had mentors. And finally, in terms of socio-demographic variables, there are more white women in the non-STEM fields than the STEM fields; the reverse is true for non-white men. More STEM faculty are tenured than non-STEM faculty.

These bivariate relationships tell only part of the story, however. A more robust test of our hypotheses is provided by regression analysis, in which the importance of predictors or job satisfaction can be assessed net of other factors.

Hypothesis one predicts that women will be less satisfied with their jobs in STEM fields than in non-STEM fields. The relevant tests of this hypothesis are found in the model 1 results in the first three columns of Table 3. We find mixed support for this hypothesis. There is no statistically significant difference between white men and white women's job satisfaction in STEM disciplines. White women in non-STEM fields are more satisfied with their jobs than white men in non-STEM fields, however. The cross-discipline test indicates that white women in STEM disciplines are in fact significantly less satisfied than white women in non-STEM disciplines - a result consistent with claims that women in STEM are uniquely disadvantaged relative to those in other fields.

Non-white women, regardless of discipline, are neither more nor less satisfied than white men. We interpret this result with caution, however, since the sample size for non-white women is so small. There are also differences among men by race. Non-white men in STEM disciplines are less satisfied with their jobs than white men in STEM fields, and the statistical test for cross-disciplinary difference is significant. There are no statistically significant differences in job satisfaction between non-white men and white men in non-STEM fields.

The test of hypothesis two, which predicts that perceptions of work and contextual variables will mediate the relationships between sex and job satisfaction, is found in model 2, Table 3 (the fourth and fifth columns of the table). If the perception and contextual factors mediate this relationship, we should 1) find statistically significant relationships between the job satisfaction and these factors, 2) the size of the coefficients for sex and race should decrease between models 1 and 2, and 3) any previously significant cross-disciplinary differences between race/sex groups should decrease in size or lose significance entirely.

We find support for hypothesis two among both white women and non-white men. White women's job satisfaction in non-STEM disciplines becomes comparable to their white male counterparts when work perceptions and context variables are added to the model. This finding indicates that white women and white men will be similarly satisfied with their jobs with similar improvements in work experiences and contexts (though interestingly enough, this is because white women's job satisfaction in non-STEM fields *becomes less positive* once other variables are added to the model). The effect for non-white men in STEM disciplines also decreases (from -0.33 to -0.20) when perceptions of work and contextual variables are added to the models, but remains statistically significant. In general terms what all of this means is that the variables added to the model have largely accounted for the differences in satisfaction between white women and white men in non-STEM fields; they are less successful in accounting for those between non-white men and white men STEM faculty. Importantly, however, in these models there are now no significant cross-disciplinary differences among white women or non-white men; those in STEM and non-STEM disciplines are essentially equally satisfied once perceptions of work and context are taken into account. This again suggests that similar improvements in workplace climates could help to level differences in satisfaction among faculty across disciplines.

Additionally, a number of contextual and perception of work variables predict job satisfaction. Because standardized coefficients are reported in the tables, one can compare the relative sizes of the effects of various factors. The most important single factor predicting job satisfaction for STEM and non-STEM faculty (net of race, sex, and other factors) is a feeling that one is valued and respected in one's department (STEM b= 0.28, non-STEM b= 0.39). Other important factors in creating satisfaction for STEM faculty members include a feeling that one's advising loads are heavier than one's colleagues (b= -0.28, a negative effect), a sense that work spills over into family (b= -0.19), and a perception that departments and the university help in balancing work and family (b=0.18). For non-STEM faculty, the only factor beyond feeling valued in one's department that is a significant predictor of job satisfaction is being satisfied with qualitative aspects of the hiring process (b= 0.28).

Mediation analyses, not reported here, indicate that the decrease in the size of coefficients for race and sex groups once controls are added is likely due to a strong, negative relationship among STEM faculty between the race and sex variables and a feeling that one is a valued and respected member of one's department. In the STEM disciplines, white women, non-white men, and non-white women all are all less satisfied on this dimension relative to white men; the same does not hold in non-STEM disciplines. One other finding from this analysis bears mentioning – though perceptions of discrimination do not predict job satisfaction in these models, all groups but STEM women are significantly more likely to report that they have witnessed discrimination on the basis of gender, race, and ethnicity than their white male counterparts in these disciplines.

The results of the test of hypothesis three, which holds that the predictors of job satisfaction will differ for STEM versus non-STEM faculty, appear in the final column of Table 3. On the whole, there are a few significant differences. Qualitative aspects of the hiring process appear to matter more for non-STEM faculty (this is a scale that includes items such as "when I was hired I felt that this position would be a good fit for me"), and a perception that one is advising more students than one's colleagues appears to be particularly significant for STEM faculty.

Independent Variables	Job Satisfaction STEM Model 1 n=196		Not STEM Model 1 n=211		STEM diff. n=407	STEM Model 2 n=196		Not STEM Model2 n=211		STEM diff. n=407
Perceptions of Work										
Hiring, financial						0.03		-0.06		
Hiring, qualitative						0.06		0.28	***	*
Respected						0.28	***	0.39	***	
Work spillover						-0.19	***	-0.08		
Family spillover						0.00		-0.02		
Dept. balance						0.18	**	0.04		
Discrimination						-0.01		0.07		
Contextual Variables										
Mentor						0.05		0.11		
Teaching, more						0.08		-0.08		*
Advising, more						-0.28	***	0.07		*
Research, more						-0.05		-0.03		
Socio-demographics										
White women	-0.09		0.16	*	*	-0.02		0.08		
Non-white men	-0.33	***	0.01		**	-0.20	***	-0.03		
Non-white women	-0.10		-0.05			0.03		0.00		
Tenured	-0.08		0.00			-0.05		0.02		

Department head	0.07	0.09	-0.01		0.04	
Control Variables						
Teaching, na			0.04		-0.05	
Advising, na			-0.03		-0.06	
Research, na			-0.03		0.07	
R-Squared	0.09	0.01	0.43		0.38	
Change in R-Squared			0.38	***	0.40	***

Notes: *** p< .001, ** p<.01, * p<.05

Table 3. Regression Analyses of Job Satisfaction (Standardized Coefficients Reported); KSU Climate Survey, 2007

It is difficult to know what to make of these differences, though the latter may be due to the fact that advising duties in STEM fields fall most heavily on the most marginalized faculty (marginalized in a way not captured by other variables in the model). There is a significant difference between STEM and non-STEM faculty on the importance of the perception of teaching more, but as this variable is significant in neither model this result is essentially uninterpretable.

On balance, however, there are more similarities than differences in the predictors of job satisfaction for faculty in STEM and non-STEM fields. Importantly, the lack of any significant differences between disciplines for race/sex groups of faculty in these final models also indicate that the effects of being in any particular group do not differ significantly for STEM versus non-STEM faculty. Our results in these models demonstrate that, net of other factors, being a white woman (or a non-white man, or a non-white woman) is not significantly better or worse in terms of job satisfaction in the STEM than the non-STEM disciplines.

DISCUSSION AND CONCLUSION

Overall, our analysis generates a relatively mixed set of findings bearing on the question of whether gender and race inequalities are concentrated only among STEM faculty. It is far clearer on the issue of the determinants of satisfaction with work and career, which are broadly similar across groups of faculty.

White women in particular are less satisfied with their jobs and careers in STEM disciplines than in non-STEM disciplines, but this difference becomes statistically insignificant once perceptions of work and contextual variables are taken into account in our models. Non-white men in STEM are less satisfied than white men with their jobs, though the size of this gap decreases once other variables are considered. Perhaps most importantly, however, for both white women and non-white men, initial differences in satisfaction between those in STEM and non-STEM disciplines are mediated by the addition of variables capturing perceptions of work and work context. A constellation of similar factors predict satisfaction for faculty across the university, from feeling like a valued member of one's department, to perceiving equity in research and advising loads, to perceiving that one was treated fairly in the hiring process.

These findings replicate many of those already in the literature. At the bivariate level, non-white men in STEM departments do appear to be particularly unsatisfied relative to white men in the same fields, and women in STEM disciplines are less satisfied than women in non-STEM disciplines. There are no significant differences between white women and white men in STEM, however (we can draw no firm conclusions about non-white women – this group is simply too small). Our comparative approach allows us to show that differences in job satisfaction do exist between STEM and non-STEM faculty, validating the implicit assumption, perhaps, of those who argue for an exclusive focus on STEM faculty.

The very good news from this analysis derives from the lack (or reduction) of significant differences among race groups of faculty and across disciplines once perceptions of work and contextual factors are taken into account. This strongly supports efforts – like those promoted by NSF ADVANCE – to alter university climates in ways that support the recruitment and retention of a diverse faculty. Our analysis indicates that department climates in particular may be key elements in creating satisfaction for faculty, as are efforts to equalize faculty workloads and support work-life balance. Our analysis further suggests that strategies like these will pay dividends for all faculty, not just those in the STEM disciplines.

This study has a number of limitations – we rely on cross-sectional data, which do not allow us to test whether the kinds of changes we suggest in climates and institutions will in fact increase satisfaction over time. The small number of non-white women faculty limit the conclusions we can draw about this group, and the small number of faculty of color within this group mean that we cannot separate under and over represented minority groups, whose experiences and perceptions of work undoubtedly differ. The study also draws on data from only one institution, limiting its generalizability. The fact that the findings we report here closely mirror those in the literature tempers this critique somewhat, however.

Future research should allow the tracking of changes over time to investigate whether improved campus climates do indeed lead to higher levels of satisfaction (and more concrete outcomes, like retention) for white women and men and women non-white faculty (of over and underrepresented groups). Qualitative work would also be useful in identifying the experiences underlying the broad measures of attitudes tested here. Such research would enhance our understanding of the kinds of changes in policies and practices that would be particularly effective. The findings of this study indicate that such changes would help to create satisfied and productive faculty not only in STEM, but in all areas of academic endeavor.

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APPENDIX A

Scale Items, KSU Climate Survey, 2007

Scale	Items	Min.	Max.	Alpha Reliability
Hiring, financial	(1) the negotiation process regarding salary was positive (2) The negotiation process regarding resources provided was positive (3) I was satisfied with my start-up package	3	15	.88
Hiring, qualitative	(1) Faculty in the department made me feel welcome (2) I was given sufficient information about the responsibilities associated with the position. (3) When I was hired I felt that this position would be a good fit for me. (4) I feel that my current position is a good fit for me	4	20	.79
Respected	(1) I am treated with respect by the staff (e.g., administrative assistants, clerical) in my department. (2) I am treated with respect by my colleagues in my department. (3) I am treated with respect by students in my department (4) I am treated with respect by my unit head (i.e., department head, department chair, director, etc.). (5) I feel informed about what is happening in my department (6) Colleagues in my department solicit my opinion about work (7) My department creates a supportive environment (8) My opinion matters in the decisionmaking process in my department (9) I feel that I am a valued member of my department	0	36	.92
Work spillover	(1) I have seriously considered leaving the university in order to achieve better balance between work and personal life. (2) I am able to balance my professional and personal life (reverse coded)	3	15	.68

	(3) I often have to forgo family/personal activities because of professional responsibilities.			
Family spillover	(1) Personal responsibilities and commitments have slowed down my career progression. (2) I often have to forgo professional activities (e.g., sabbaticals, conferences) because of family/personal responsibilities.	2	10	.76
Department balance	(1) There is a supportive environment in my department for taking leave due to personal obligations/activities. (2) The university provides information about resources that help me balance work and family. (3) Most faculty in my department are supportive of colleagues who want to balance their family and career lives.	3	15	.69
Discrimination	(1) Please indicate how often the following behavior occurs in your current work environment: discrimination on the basis of race (never, rarely, sometimes, often, usually, always) (2) Discrimination on the basis of ethnicity (3) Discrimination on the basis of gender	0	12	.85