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ScienceDirect
The Social Science Journal 46 (2009) 539–556
The SOCIAL SCIENCE JOURNAL
www.elsevier.com/locate/soscij

Faculty job satisfaction across gender and discipline☆

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Received 24 May 2008; received in revised form 22 April 2009; accepted 26 April 2009

Abstract

It is projected that by 2014 colleges, universities, and professional schools will witness an employment growth of 34.3% (Bureau of Labor Statistics, 2005). Thus, issues of faculty satisfaction, retention, and persistence will become increasingly important for university administrators and education policy makers. The need to study faculty satisfaction at universities also stems from the fact that the intellectual and social structures of higher education are changing over time. Increasingly, women and minorities are more likely to occupy higher ranks of the professoriate. The purpose of this research is to explore and compare the job satisfaction rates of faculty members employed in research institutions with special attention paid to differences across gender and disciplines. The study employs data from the 2003 Survey of Doctorate Recipients, which is a biennially collected survey of doctoral awardees and is funded by the National Science Foundation.
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As senior faculty members retire at the leading U.S. universities over the next decade, it is increasingly likely that they will be replaced by younger faculty members who are women, under-represented minorities or foreign-born scholars. This changing landscape of faculty members at U.S. universities will require that university administrators deal with issues related to faculty job satisfaction across a variety of personal and professional dimensions (Okpara, Squillace, & Erondu, 2005; Tack & Patitu, 1992). The purpose of this study is to analyze the

☆ The use of National Science Foundation (NSF) data does not imply NSF endorsement of the research methods or conclusions contained in this report.

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0362-3319/$ – see front matter Published by Elsevier Inc on behalf of Western Social Science Association.
doi:10.1016/j.soscij.2009.04.015

job satisfaction of U.S. faculty members that are employed in universities, with a particular focus on gender and disciplinary differences. Some previous studies have focused on the job satisfaction of faculty; however, little previous research has explored both gender and disciplinary differences as we do here. For example, most gender-based satisfaction studies have focused only on natural science and engineering fields (Callister, 2006; Ginther, 2004; Long, Allison, & McGinnis, 1993).

The study of faculty satisfaction rates is important because dissatisfaction with any aspect of a faculty position can result in decreased productivity and quality of work (Tack & Patitu, 1992). Another reason why job satisfaction has been extensively researched is that most individuals spend a large part of their lives at work. Therefore, a detailed understanding of job satisfaction is the key to improving the well-being of a large number of working individuals (Gruneberg, 1979).

For the analysis in this manuscript, we use the National Science Foundation's 2003 *Survey of Doctorate Recipients* (SDR) dataset. This dataset allows us to group faculty members into distinctive disciplinary affiliations and, therefore, study the gender differences that exist within (and across) each group. According to Hagedorn (2000), disciplinary differences are similar to gender and ethnic differences because groups that are alike share common attributes and a common culture. Discipline-specific research is also important in determining faculty turnover and retention as demonstrated in a recent study by Xu (2008). Although this study does not measure the direct impact of job satisfaction on retention, it is an important step in that direction. A deeper understanding of these similarities and differences can help university administrators and academic directors identify (and enhance) the factors that lead to increased levels of faculty job satisfaction within and across disciplines.

1. Job satisfaction for faculty members

While the majority of previous job satisfaction studies have focused on industrial and organizational settings, there is much less literature on job satisfaction levels of academic faculty members. Tack and Patitu (1992) performed a count of the number of articles indexed within the research databases ERIC and PsycINFO during the period of 1970–1992 on the topic of job satisfaction. They found that only 13.7% of all satisfaction articles were focused on faculty job satisfaction. According to Pearson and Seiler (1983, p. 36) "this area has not received attention because a high level of job satisfaction generally has been presumed to exist in a university setting." Several demographic, institutional, and personal factors have been shown to impact job satisfaction levels for faculty members. A large number of researchers have used a combination of variables such as gender, ethnicity, job achievement, nature of work, salary, collegial relationships, and rank and tenure to study their impact on faculty job satisfaction. We will briefly explore the most important of these variables for our study.

1.1. Gender as an explanatory variable

The majority of studies that focus on faculty satisfaction have explored the relationship between satisfaction and gender (August & Waltman, 2004; Bilimoria et al., 2006; Callister, 2006; Hagedorn, 2000; Hult, Callister, & Sullivan, 2005; Okpara et al., 2005; Olsen, Maple, &

Stage, 1995; Oshagbemi, 1997; Ropers-Huilman, 2000; Sax, Hagedorn, Arredondo, & Dicrisi, 2002; Settles, Cortina, Malley, & Stewart, 2006; Tack & Patitu, 1992; Ward & Sloane, 2000). Most of these studies have found that male faculty members have higher levels of overall job satisfaction than female faculty members, particularly in terms of benefits and salary received (Bilimoria et al., 2006; Callister, 2006; Hult et al., 2005; Olsen et al., 1995; Settles et al., 2006; Tack & Patitu, 1992). On the other hand, Ward and Sloane (2000) did not find any significant differences between male and female faculty members in overall levels of job satisfaction. They did observe, however, that male faculty members had almost three times the satisfaction levels of female faculty members when it comes to promotion opportunities. Okpara et al. (2005) and Oshagbemi (1997) found that female faculty members in higher academic ranks expressed more satisfaction with their jobs than their male peers.

1.2. Disciplinary affiliation as an explanatory variable

On the other hand, there is relatively little research on the impact of discipline on faculty satisfaction. Hagedorn (2000) used several individual and environmental characteristics to construct a conceptual framework of faculty job satisfaction. She divided the variables that contribute to faculty job satisfaction into two main categories: (1) mediators and (2) triggers. Academic discipline served as a mediator in the model to predict faculty job satisfaction. Yet, Hagedorn did not find academic discipline as a significant predictor of job satisfaction. A similar result was obtained by Olsen et al. (1995) who attempted to explain the job satisfaction of women and minority at a Carnegie Research I university. Disciplinary differences were observed in the amount of time expended by faculty in research and teaching, but discipline did not have an impact on job satisfaction levels.

A study by Ward and Sloane (2000), however, concluded that there are significant differences in job satisfaction levels based on the gender and disciplinary affiliation of faculty members. For female faculty members, they found that engineers were the most satisfied and social scientists were the least satisfied. For male faculty members, they concluded that social scientists had the highest levels of satisfaction and natural/physical scientists had the lowest levels. Although their study examined job satisfaction across gender and discipline, it was based on a sample of 900 academics at five Scottish universities more than a decade ago. Disparity in pay across disciplines has also been shown to impact faculty job satisfaction (Morse, 1953; Ward & Sloane, 2000). Morse (1953) found that dissatisfaction can occur when a faculty member experiences inequities with pay based on discipline or the amount of work they accomplish. Ward and Sloane (2000) observed that engineering faculty members express the highest levels of satisfaction with pay when compared with scientists, social scientists, medical and arts faculty members.

1.3. Control variables

We include a variety of control variables in our exploration of the relationship between gender, discipline and faculty satisfaction. In this section, we give a brief overview of some literature that has explored the importance of these control variables for studying faculty job satisfaction. We classify these variables into four main categories: (1) demographic, (2) institutional, (3) career, and (4) productivity.

1.3.1. Demographic variables

Some scholars have found that faculty of color and female faculty members encounter more barriers while advancing up the academic ladder (Hagedorn, 1996; Laden & Hagedorn, 2000; Menges & Exum, 1983; Perna, 2001; Peterson, Friedman, Ash, Franco, & Carr, 2004; Tack & Patitu, 1992; Toutkoushian, 1999; Turner & Myers, 2000). For example, Peterson et al. (2004) concluded that minority faculty members in medicine experience an ethnic bias, which results in their lower overall job satisfaction rates when compared with other faculty members. In a UCLA (University of California, Los Angeles) study of faculty members from two- and four-year institutions, Antonio, Cress, and Astin (1997) found that faculty of color are typically less satisfied with almost every aspect of their job when compared with Caucasian faculty.

Marital status and children can also impact faculty satisfaction. The results of studies that explore the relationship between marriage and faculty job satisfaction have yielded mixed results. On the one hand, marriage has been shown to increase satisfaction levels for faculty members (Cetin, 2006; Hagedorn, 2000; Leung, Siu, & Spector, 2000). Yet, some studies have shown that marriage can have a negative impact on faculty job satisfaction (Aisenberg & Harrington, 1988; Bryson, Bryson, & Johnson, 1978). Additionally, the presence of children in the household has been found to impact job satisfaction. Carr and Ash (1998, p. 536) found that "women with children published less, had slower self-perceived career progress, and were less satisfied with their careers than were men with children."

1.3.2. Institutional variables

Another key factor in faculty career satisfaction is the nature of the work itself – i.e., the proportion of time spent conducting research and teaching (Hagedorn, 2000; Olsen et al., 1995; Smart, 1990). Teaching and conducting research are often the supporting pillars in a faculty member's work life. A study conducted by Olsen et al. (1995) found that faculty members who expressed greater satisfaction with teaching are less likely to receive support and recognition from their peers in their department. Liu (2001) reached a similar conclusion when she found that faculty members who spend a greater percentage of time on teaching (and less time on research) express greater dissatisfaction with their work. She also concluded that faculty members that expressed greater satisfaction with research were more likely to attain tenure and had significantly greater support from their peers. Liu (2001) found that faculty members in the natural/physical sciences and engineering were more likely to spend time conducting research than teaching.

1.3.3. Career variables

Rank and tenure are additional control variables for faculty job satisfaction (Adkins, Werbel, & Farh, 2001; Herzberg, Mausner, & Snyderman, 1959; Oshagbemi, 1997; Tack & Patitu, 1992; Ward & Sloane, 2000). According to Herzberg et al. (1959), employees with higher job ranks will have higher levels of job satisfaction. Oshagbemi (1997) concluded that full professors report a higher mean level of satisfaction when compared to junior faculty members. Thus, rank continues to be a highly significant predictor of job satisfaction among academics, with full professors expressing greater job satisfaction than junior faculty members. Adkins et al. (2001) found that tenured faculty members have significantly higher levels of perceived job

security. Similarly, Bender and Heywood (2006) concluded that tenured faculty members have higher job satisfaction levels than untenured faculty members.

1.3.4. Productivity variables

Additional studies have explored the linkages between work activities and productivity. In particular, several researchers have found that increased time spent on research positively impacts faculty productivity and job satisfaction (Fox, 1992; Marsh & Hattie, 2002). The impact of scholarly productivity on faculty job satisfaction is a topic that is disputable. Often previous studies have used proxies for faculty productivity (e.g., the number of journal/book publications or time spent on research) as predictors of faculty job satisfaction levels (August & Waltman, 2004; Blackburn & Lawrence, 1995; Hagedorn, 2000; Lahey & Vihtelic, 2000; Olsen et al., 1995). Some scholars suggest that satisfaction with work is a predictor of faculty productivity (Pfeffer & Langton, 1993; Spector, 1997; Tack & Patitu, 1992), while others believe that the reverse relationship is more descriptive. August and Waltman (2004) employed Hagedorn's (2000) conceptual model of measuring job satisfaction to study the overall career satisfaction of female faculty members employed at a Midwestern Carnegie Research I university. They found that the number of publications and presentations by women faculty members did not have a significant impact on the overall job satisfaction.

2. Research question and hypotheses

The overarching research question for this study is "How does job satisfaction of faculty members differ by gender and discipline?" Based on previous studies, we have developed some hypotheses that seek to test the details of how satisfaction rates for faculty members vary across gender and discipline. Overall, we anticipate that female faculty members (regardless of discipline) will experience lower satisfaction rates when compared to their male peers.

H_1: After controlling for demographic, institutional and career-related variables, women faculty members will experience lower levels of job satisfaction than male faculty members across all disciplines.

Compared with gender, there is less research on the impact of academic discipline on faculty satisfaction. Most of the studies that have included discipline as an explanatory variable did not find that disciplinary differences significantly impacted faculty members' job satisfaction levels (Hagedorn, 2000; Olsen et al., 1995). However, a study conducted by Ward and Sloane (2000) did find disciplinary differences among faculty members based on gender. The authors found that women engineers expressed the highest level of job satisfaction when compared with women faculty members in arts, science, medicine, and social science fields. One the other hand, among male faculty members, social scientists expressed the highest satisfaction when compared to their peers in different disciplines. Based on the study by Ward and Sloane's (2000) we have developed a few hypotheses that are based on disciplinary differences. These hypotheses are outlined below:

H_2: Among female faculty members, those in engineering fields will experience the highest levels of job satisfaction.

H_3: Among male faculty members, those in the social sciences will experience the highest level of job satisfaction.

In the next two sections, we outline the details of our dataset and present the findings of our analysis.

3. Data

For the research presented in this manuscript, we use the National Science Foundation's 2003 *Survey of Doctorate Recipients* dataset. The rationale for using this dataset is based largely on the comprehensive nature of the diverse variables in the dataset (including data on demographics, faculty career trajectories, research productivity, and job satisfaction). In addition, the SDR dataset is longitudinal in nature, with a sample of the most recent graduates added every two years. This is one of the most comprehensive datasets available for studying trends and patterns among doctoral recipients in the U.S.

The survey is funded by the National Science Foundation and the National Institutes of Health. The sample includes doctorate recipients who received a degree before June 30, 2002 in any field of science or engineering (including the social sciences). All participants were under 76 years of age as of October 1, 2003[3] (which was taken as the survey reference week). A total of 40,000 individuals with doctoral degrees were sampled in the 2003 survey. To account for inequalities in the sample due to selection and non-response biases, the final data were weighted. The weighting variable is included by NSF in the dataset and all of our results are reported for weighted data unless we specify that non-weighted data were used.

The original un-weighted sample size was 29,915 and the weighted sample size was 685,296. The analysis for this study focuses only on full time academic scientists; hence we filtered out all respondents with non-academic jobs before beginning the analysis. We completed this filtering process in three steps. First, we filtered out all respondents that did not work full time. This yielded a weighted sample size of 530,962. Second, for the academic-only filtering process, we counted academics as those faculty members working in a four-year college or university during the reference week of October 2003. This filtering process reduced the weighted sample size to 238,674. The third filtering step involved removing post-docs from the sample, which yielded a final weighted sample size of 223,424.

For the analysis presented here, we include respondents from disciplines who reported their highest degree in one of the following fields: (1) biological, agricultural, and environmental sciences; (2) computer and information sciences; (3) mathematics and statistics; (4) physical sciences; (5) psychology; (6) social sciences; (7) engineering; and (8) health. These disciplines were further grouped into four main categories based on similarities across fields: (1) *science*, which includes biological, agricultural, and environmental sciences, computer and information sciences, mathematics and statistics, and physical sciences; (2) *social science*, which includes social sciences and psychology; (3) *engineering*, which includes all fields of engineering; and (4) *health*, which includes audiology and speech pathology, health services administration, medicine, nursing, pharmacy, physical therapy, public health, as well as all other health or medical sciences.

4. Findings

Table 1 provides an overview of the descriptive statistics for the filtered, weighted sample by disciplinary category and gender. Across all disciplines, male faculty members were significantly more likely than female faculty members to be married. Within engineering fields, female faculty members were significantly more likely to live with children as part of their family; yet in all other disciplines, male faculty members were more likely to have children living with them as part of their family. Interestingly, there were no significant differences across gender for ethnic groups within the engineering fields except "Other Ethnicities." However, a significantly higher percentage of Caucasians were male within science and social science fields. Furthermore, while the health fields had significantly higher percentages of male faculty members who were Asian, the science fields had significantly higher percentages of female faculty members who were Asian. Lastly, within the science, social science and health fields, there were higher percentages of female faculty members in under-represented minority groups.

Across all disciplines, male faculty members had significantly more years of experience (defined as years since completion of highest degree) and were more likely to be tenured. Men also had significantly higher salaries than female faculty across all disciplines. In addition to analyzing annual salaries, we also explored differences in total household incomes for the respondents. In the case of engineering fields, there were no significant differences across gender for total household income. Yet, within the science, social science and health fields, male faculty members had significantly higher household incomes than female faculty members.

Our analysis also included several institutional variables. Male faculty members were significantly more likely to be employed in a Carnegie Research I or II university in the fields of science, engineering, and health. On the other hand, female faculty members were more likely to be employed in these institutions within social science fields. Across all disciplines, men were more likely to work at a public university than women. Lastly, within all fields except engineering, male faculty members were more likely than female faculty members to have R&D as their primary work activity. Interestingly, in the engineering fields, women were significantly more likely than men to focus their primary work activities on R&D.

4.1. Faculty job satisfaction by gender and discipline

The NSF 2003 SDR dataset includes 10 variables that measure different dimensions of job satisfaction. The first nine dimensions measure the respondent's satisfaction with various components of their current job including: (1) opportunity for advancement, (2) benefits, (3) intellectual challenge, (4) degree of independence, (5) location, (6) level of responsibility, (7) salary, (8) job security, and (9) contribution to society. The last variable for job satisfaction is a measure of the respondent's overall job satisfaction. For each variable, the respondents were asked to rate their levels of satisfaction on a four-point scale ranging from "very dissatisfied" to "very satisfied."

In Table 2, we present the differences in satisfaction across gender and disciplines. This table shows that across all fields men had significantly higher levels of overall job satisfaction and significantly higher levels of satisfaction with job security. When we focused only on women, we found that females in the health fields were the most satisfied (mean = 3.41), followed by the

Table 1
Descriptive statistics across discipline and gender.[a].

Independent variables	Science			Social science			Engineering			Health		
	Mean for female	Significance	Mean for male	Mean for female	Significance	Mean for male	Mean for female	Significance	Mean for male	Mean for female	Significance	Mean for male
Sample size	26,466		89,587	26,853		42,990	2,548		23,023	7,436		4,521
Demographic variables												
% Married	67.7	***	82.8	59.9	***	79.0	73.3	***	84.6	64.2	***	86.3
% Living with children	45.2	***	52.0	41.8	***	46.4	52.7	*	50.4	37.7	***	62.8
% Born in U.S.	75.2	***	76.9	86.0	***	83.4	64.4	***	60.7	86.1	***	77.8
% Caucasian, non-Hispanic	75.7	***	80.6	81.4	***	84.6	71.3		70.2	81.5		81.2
% Asian	16.8	***	13.5	6.0		6.3	20.5		21.9	7.3	***	11.6
% African American	3.5	***	2.2	7.3	***	4.6	4.6		3.9	6.3	***	4.9
% Hispanic	3.5	***	2.8	4.3	***	3.3	3.6		3.2	3.1	**	2.2
% Other ethnicity	0.5	***	0.8	1.0	*	1.2	0.0	***	0.9	1.8	***	0.0
Career variables												
% Tenured	38.7	***	56.7	46.2	***	66.5	37.2	***	61.8	40.0	***	51.2
Years of experience	14.1	***	18.9	13.3	***	19.0	9.5	***	17.8	10.4	***	14.4
Total income previous year ($)	183,552	*	201,711	120,006	***	174,549	169,375		134,600	165,871	***	327,489
Annual salary ($)	71,034	***	84,230	67,202	***	80,524	75,709	***	91,959	71,575	***	83,819
Institutional variables												
% at Carnegie Research I/II university	48.9	***	51.3	46.1	***	43.0	51.5	***	59.6	43.6	*	45.7
% Employed by public university	60.5	***	64.7	61.4	***	63.3	60.2	***	67.6	68.8	***	74.9
% R&D: primary activity	43.2	**	44.2	26.5	***	31.7	47.7	***	39.3	32.6	**	35.4
% Teaching: primary activity	37.6	***	36.2	49.9		49.3	38.2	*	40.5	43.8	***	36.7
% Management: primary activity	11.1	***	12.0	13.0		13.0	9.3	***	14.4	18.3		18.6
% Other: primary activity	8.0		7.7	10.5	***	6.0	4.8	*	5.7	5.3	***	9.2

Data source: National Science Foundation, 2003 Survey of Doctorate Recipients.

[a] $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Table 2
Comparison of means for satisfaction variables across discipline and gender.[a,b].

Variables	Science			Social Science			Engineering			Health		
	Mean for female	Significance	Mean for male	Mean for female	Significance	Mean for male	Mean for female	Significance	Mean for male	Mean for female	Significance	Mean for male
Sample size	26,466		89,587	26,853		42,990	2,548		23,023	7,436		4,521
(*1 = very dissatisfied, 2 = somewhat dissatisfied, 3 = somewhat satisfied, 4 = very satisfied*)												
Satisfaction with current job's. . .												
Opportunity for advancement	2.96	***	3.06	2.99	***	3.03	2.99		2.99	2.99		3.06
Benefits	**3.30**	***	3.24	3.21	***	3.25	3.28	***	3.20	**3.30**	**	3.26
Intellectual challenge	3.58		3.57	3.50	*	3.49	3.47	***	3.57	**3.52**	*	3.49
Degree of independence	**3.70**	**	3.69	3.66	***	3.71	3.68		3.69	3.65	***	3.69
Location	3.38	**	3.40	3.38	***	3.35	3.36	***	3.42	3.39		3.37
Level of responsibility	**3.55**	***	3.52	3.53	***	3.50	3.34	***	3.49	3.47		3.46
Salary	2.90	***	2.99	2.82	***	2.96	2.94	*	2.98	2.91		2.94
Job security	3.19	***	3.42	3.29	***	3.53	3.26	***	3.52	3.27	***	3.49
Contribution to society	3.57		3.57	3.57	*	3.56	3.55		3.57	**3.72**	***	3.56
Overall measure of satisfaction												
Overall job satisfaction	3.40	***	3.44	3.38	***	3.47	3.31	***	3.47	3.41	***	3.47

Data source: National Science Foundation, 2003 Survey of Doctorate Recipients.

[a] $*p<0.05$, $**p<0.01$, $***p<0.001$.

[b] Shaded cells indicate the gender that is significantly more satisfied for each variable.

sciences (mean = 3.40), the social sciences (mean = 3.38) and, lastly, engineering (mean = 3.31). This trend was different for men, with male faculty members in the social sciences, engineering, and health fields being equally satisfied (mean = 3.47). Male faculty members in the sciences were the least satisfied, however, with a mean overall job satisfaction of 3.44. Interestingly, the least satisfied groups of males (i.e., scientists) were still more satisfied on average than the most satisfied females (i.e., health fields).

Within the science and social science fields, men were significantly more satisfied with their opportunities for advancement than women. In the previous section, we demonstrated that men had higher salaries than women for all disciplines. This discrepancy seems to have an influence on the levels of satisfaction that women experience with their annual salaries. For all areas except health, men were significantly more satisfied with their salaries than women. Within the health fields, men reported a higher average level of satisfaction with salary, but the difference in means was not significant across gender.

For many of the other satisfaction variables, the results were mixed across gender and discipline. With respect to job benefits, women were significantly more satisfied than men for all fields except the social sciences. In the social sciences and health fields, women were more satisfied with the intellectual challenge of their jobs than their male peers. Yet, within engineering fields, men were more satisfied with the level of intellectual challenge they experienced in their jobs. Within the realm of job independence, male faculty members were more satisfied than female faculty members in the social sciences and health fields, but female faculty members were more satisfied in the sciences.

Job location was another area in which male faculty members were more likely to be satisfied. Within the sciences and engineering, male faculty members were more pleased with their job locations than female faculty members. The trend was reversed only for the social science fields. With respect to level of job responsibility, women in the sciences and social sciences were more satisfied than their male peers. On the other hand, male engineers were more pleased with their level of responsibility than female engineers. Lastly, women in the social sciences and health fields were more satisfied with the way their jobs contribute to society, but there were no significant differences across gender for this variable within the science and engineering fields.

Overall, these results show that, with a few exceptions, male faculty members in all disciplines have generally higher levels of job satisfaction than female faculty members. This is in line with the results from several previous studies on gender and job satisfaction (Callister, 2006; Hult et al., 2005; Olsen et al., 1995; Settles et al., 2006; Tack & Patitu, 1992). To further explore the relationship between gender, discipline, and satisfaction levels, we created an overall satisfaction index that could be used as the dependent satisfaction variable in an OLS regression analysis.

4.2. OLS regression analysis: satisfaction levels across gender and discipline

Many previous studies on faculty job satisfaction have used a single global variable that measures the overall job satisfaction of an individual without taking into account the various aspects of job satisfaction (August & Waltman, 2004; Hagedorn, 2000; Liu, 2001). Oshagbemi (1999) conducted a study to compare single-item measures and multiple-item measures of

job satisfaction. He concluded that the single-item measures tend to overestimate the level of employee satisfaction and underestimate the percentage of disgruntled employees. The use of a multiple-item measure brings out more detail and richness in understanding the various aspects of satisfaction/dissatisfaction of employees with their jobs. Thus, we use a satisfaction index that combines nine dimensions of job satisfaction as our dependent variable. The nine dimensions are: (1) opportunity for advancement, (2) benefits, (3) intellectual challenge, (4) degree of independence, (5) location, (6) level of responsibility, (7) salary, (8) job security, and (9) contribution to society. We computed the satisfaction index by summing the respondent's score for each of the nine satisfaction variables. The resulting index has a Cronbach's alpha reliability of 0.79, which indicates that the index is sufficiently reliable.

In our regression analysis, we included four categories of independent variables: demographic variables, institutional variables, career variables, and productivity variables. We measured productivity by the number of journal articles or books published and the number of grants received by faculty members during a span of five years from 1998 to 2003 (which is a standard variable in the SDR dataset). Since exploring the differences in satisfaction levels across disciplines was a major focus for our data analysis, we ran one model for each disciplinary category to explore how gender and satisfaction were related when controlling for the four categories of control variables. The same regression model was run for each disciplinary category. The results are presented in Table 3.

4.3. Gender and discipline

Table 3 demonstrates that the results for job satisfaction varied by gender and discipline. In the sciences, we found that men were significantly less satisfied than females when controlling for the other variables in the model. Interestingly, this finding was the opposite of the result that we found when not including control variables in our analysis (i.e., results in Table 2). However, in the social sciences and engineering disciplines, males and females had similar levels of job satisfaction after including control variables. These results stand in direct contrast to the findings of several past studies that reported female faculty members express lower job satisfaction than male faculty members (Bilimoria et al., 2006; Callister, 2006; Hult et al., 2005; Olsen et al., 1995; Settles et al., 2006; Tack & Patitu, 1992).

The results for faculty in health disciplines were quite similar to the sciences. Men in the health fields had significantly lower levels of satisfaction than women after including control variables in the model. Nyquist, Hitchcock, and Teherani (2000) found that female faculty members were less satisfied with opportunities for advancement, mentoring, salary, and support for research when compared with their male peers. This was the opposite of our findings for the health fields.

We can speculate about some reasons why we observed a shift in our results for gender differences in satisfaction after including control variables. First, women might place a greater emphasis on intrinsic values (such as feelings of accomplishment, recognition, and autonomy), which could lead to higher job satisfaction levels when they are compared with men who might place greater value on extrinsic factors (such as salary and job security) (Gruneberg, 1979). Our results indicate that this might be the case because women faculty members in science, engineering, and health disciplines express significantly higher satisfaction levels

Table 3
OLS regression: satisfaction levels across disciplines (DV: satisfaction index).[a].

Independent variables	Coefficients for disciplines			
	Model 1: science	Model 2: social science	Model 3: engineering	Model 4: health
Demographic variables				
Male	−0.73***	0.04	0.22	−0.56***
Married	0.23**	0.33**	0.31	1.55***
Total number of children	0.13***	0.08*	−0.01	−0.02
Spouse does not work[b]	0.45***	−0.63***	0.28**	0.48*
Born in U.S.	0.40***	−0.63***	0.67***	−1.81***
Asian, non-Hispanic[c]	−0.86***	−1.29***	−0.83***	−2.43***
African American, non-Hispanic[c]	0.33*	0.35	0.78***	0.69**
Hispanic[c]	0.26*	−0.59**	−0.92***	−0.36
Other ethnicity	0.29	−0.07	–	2.46**
Institutional variables				
Carnegie Research I or II university	0.12**	0.48***	1.74***	−0.29
Public university	−0.64***	−0.08	−0.04	2.03***
Employer size: 1–99[d]	1.92***	0.80	4.66***	−2.25***
Employer size: 100–999[d]	−0.35***	1.41***	0.12	−0.72
Employer size: 1000–24999[d]	0.02	0.87***	−0.01	1.68***
Primary work activity: teaching[e]	−0.51***	−0.62***	−0.05	−1.89***
Primary work activity: management[e]	−0.63***	0.55***	−0.70***	−1.10***
Primary work activity: other[e]	−0.06	0.74***	−1.45***	−1.07***
Career variables				
Associate professor[f]	−0.62***	−0.88***	0.01	−1.46***
Assistant professor[f]	−0.31***	−0.71***	1.54***	−2.95***
Other position rank[f]	−1.17***	−2.58***	1.71***	−4.25***
Years of experience	−0.02***	−0.02***	0.03***	−0.09***
Tenured	1.22***	0.14	0.83***	−0.57**
Hours worked per week	−0.01***	−0.05***	−0.03***	0.02*
Annual salary	0.00***	0.00***	0.00***	0.00***
Number prof. assoc. memberships	−0.07***	0.10***	0.21***	−0.26***
Attended prof. meetings previous year	0.64***	−0.16	2.32***	1.12***
Job related to highest degree	1.02***	−0.56*	0.69	–
Productivity variables				
Number of articles	0.01***	0.01**	−0.03***	0.01
Number of books	0.01*	0.12***	0.01	0.27***
Grant source: Department of Agriculture	0.19**	0.42*	−0.15	3.38***
Grant source: Department of Education	0.51**	−0.63***	0.00	0.12
Grant source: Department of Defense	0.73***	0.53**	−0.30**	−4.44***
Grant source: Department of Energy	0.23***	−5.32***	−1.39***	–
Grant source: Department of Transportation	0.34	0.69**	0.40*	–
Grant source: EPA	−0.71***	0.79**	−1.17***	3.80***
Grant source: HHS	−0.42***	−1.27***	0.89***	1.41***
Grant source: NASA	0.56***	2.80***	−0.86***	7.68***
Grant source: NIH	0.18***	−0.25*	−1.18***	1.71***
Grant source: NSF	0.33***	0.18	0.07	−1.85**
Grant source: other	−0.26***	−0.01	1.03***	2.70***
(Constant)	28.67***	32.68***	24.23***	28.86***
Adjusted *R* square	0.15	0.19	0.20	0.43
Weighted sample size	116,054	69,843	25,571	11,957
F value	158.3***	57.28***	51.90***	47.35***

Data source: National Science Foundation, 2003 Survey of Doctorate Recipients.

[a] $*p<0.05$, $**p<0.01$, $***p<0.001$.

[b] Reference category: spouse does work.

[c] Reference category: Caucasian, non-Hispanic.

[d] Reference category: 25,000+

[e] Reference category: primary work activity is research and development.

[f] Reference category: full professor.

with their job benefits than their male peers. Similarly, when asked how satisfied they are with the contributions of their job to society, women faculty members in the social sciences and health express higher average satisfaction than their male peers. Some scholars have shown that women often place lower expectations on themselves because traditionally their jobs have been lower quality jobs than men have had (Clark, 1997). This could lead to a higher level of perceived job satisfaction among women (even if they receive less than men). The next section discusses the results for the four categories of control variables employed in this study.

4.4. Control variables

Additional analysis of our control variables showed that African Americans are equally, or more, satisfied than Caucasians across all disciplinary groups. These findings contrast with the results of several other studies that have shown that faculty of color have lower levels of job satisfaction when compared with Caucasian faculty members (Antonio et al., 1997; Peterson et al., 2004; Tack & Patitu, 1992). Furthermore, in all cases except engineering, Asians were the least satisfied faculty members. Scientists who were born in the U.S. were more satisfied than their foreign-born peers, which is a result that confirms findings by Corley and Sabharwal (2007). Interestingly, the results reversed for social scientists. Foreign-born faculty members employed in social science disciplines are significantly more satisfied than their U.S.-born peers. This finding calls for further investigation given that several studies have found foreign-born faculty members in science and engineering to express lower satisfaction levels than U.S.-born academics.

Faculty members in the sciences, social science, and health fields who reported teaching as their primary work activity were less satisfied than faculty members who reported R&D as their primary work activity. This result was similar to findings by Olsen et al. (1995) and Liu (2001), both of whom concluded that research has a positive impact on satisfaction while teaching can have a negative impact. Scientists, social scientists, and engineers who worked at Carnegie Research I or II universities had higher levels of satisfaction than those who worked at other types of universities. The results were different for health faculty. In other words, being employed at a Carnegie Research I or II university did not have a significant impact on their job satisfaction. Additionally, scientists working at public universities were less satisfied than scientists working at private universities while health faculty members were more satisfied at public universities.

Our analysis demonstrates that research productivity is related to job satisfaction in a variety of ways. Among engineering faculty, those with higher levels of article productivity had lower levels of job satisfaction. Yet, we found that among the science and social science fields (where higher numbers of articles are correlated with higher levels of faculty satisfaction) higher levels of book productivity were correlated with higher levels of job satisfaction. The overall trend for scientists, social scientists, and health faculty was that funding from federal agencies is linked with higher job satisfaction rates. Interestingly, engineering faculty members funded by federal agencies like Department of Defense, Department of Energy, EPA, NASA, and NIH had significantly lower levels of job satisfaction. Attending professional meetings was also related to increased satisfaction levels among scientists and health faculty members. On the other hand, increased professional society membership was linked with a lower satisfaction

level for these faculty members. Thus, it appears that the social interaction at meetings is more important than association membership for job satisfaction in the health and science fields. Yet, increased professional association memberships were correlated with higher satisfaction levels for social scientists. Also, for social scientists, attending professional meetings does not impact satisfaction levels. Engineers who had more professional association memberships and attended profession meetings were more satisfied than their less connected peers.

Our findings by academic rank indicated that within the sciences, social sciences, and health disciplines, full professors were more satisfied than associate and assistant professors. This result is in agreement with previous studies that found full professors expressing higher levels of satisfaction when compared with associate and assistant professors (Oshagbemi, 1997; Tack & Patitu, 1992). Once we included the control variables in our regression models, however, the results changed for engineering. In this field, assistant professors were more satisfied than associate professors while there was no significant difference in satisfaction levels of associate and full engineering professors. One possible explanation might be that junior faculty in engineering demonstrate higher levels of productivity when compared with associate and full professors (Kyvik, 1990), which could lead to higher satisfaction levels. Higher salaries are correlated with higher levels of satisfaction for all disciplines.

Tenured faculty members are more satisfied than untenured faculty within sciences, social sciences, and engineering, while the reverse is true for faculty in the health fields. It is difficult to directly compare this result with the previous study done by Adkins et al. (2001) (which found a positive correlation between tenure and job satisfaction) because their study did not account for disciplinary differences. Among the non-work related factors that impact job satisfaction we found that married faculty members have higher satisfaction levels than unmarried faculty members in the sciences, social sciences, and health disciplines. This is a finding that supports previous results (Cetin, 2006; Hagedorn, 2000; Leung et al., 2000). We also found a positive correlation between the number of children living at home and the job satisfaction levels for scientists and social scientists.

5. Discussion and conclusions

Across all disciplines, we found that female faculty members expressed lower levels of satisfaction when compared with male faculty members. Yet, this relationship largely disappeared when we included several demographic, institutional and career-related factors in the model. We hypothesized that women would have lower levels of job satisfaction than their male peers even when controlling for these types of variables. Interestingly, this hypothesis was not verified for any of the disciplinary categories. Within the science and health fields, men were significantly less satisfied than women. In the engineering and social science fields, there was no significant difference in satisfaction levels for men and women.

Surprisingly, these findings are not in line with the popular literature on gender and satisfaction (Bilimoria et al., 2006; Callister, 2006; Hult et al., 2005; Olsen et al., 1995; Settles et al., 2006; Tack & Patitu, 1992). This could be due to a combination of several factors. First, there could be differences in the types of studies conducted. While our study focuses on differences across disciplines and gender, the only previous study that examines job satisfaction for women

across disciplines was conducted by Olsen et al. (1995). In addition, most of the previous studies focus on a very small subset of faculty at one institution instead of using a large national sample (such as the SDR dataset that we use). In addition, several of the previous studies focus on specific factors that cause job satisfaction rather than a combination of institutional, personal, and career variables. Second, female faculty members have been shown to place a greater emphasis on intrinsic factors (e.g., contribution to the society, opportunities for advancement, and intellectual challenge) in comparison to male faculty members, who place greater emphasis on extrinsic factors (e.g., salary and benefits) (Gruneberg, 1979). Although our study found that female faculty members earn lower salaries than men across all disciplines, their overall satisfaction rates are higher than (or comparable to) their male peers. This finding reinforces our speculation that women might place a greater emphasis on intrinsic than extrinsic factors.

Our second and third hypotheses were related to differences across disciplines. We hypothesized that among female faculty members, engineers would have the highest levels of job satisfaction – and that among male faculty members, social scientists would have the highest levels. When we analyzed the overall job satisfaction levels for women, this hypothesis was not verified. The disciplinary category with the highest satisfaction levels for women was health, followed by science, social science and, lastly, engineering. Even though this hypothesis was not confirmed for overall job satisfaction, it was verified for satisfaction with salary. This result stands in direct contrast to a study performed on Scottish faculty by Ward and Sloane (2000). They concluded that among women faculty members, engineers express the highest level of overall job satisfaction and social scientists express the lowest levels. We speculate that some of these differences between our findings and those of Ward and Sloane could be due to institutional differences between U.S. and European universities. The inclusion of teaching assistants and fellows in their sample could also lead to different findings on job satisfaction. Teaching and research assistants have different sets of expectations and motivations, thus, including them as part of the study on academics can result in varying results.

The results in our study were mixed for men. Difference of mean tests indicated that male faculty members in the social sciences, engineering, and health fields had higher levels of job satisfaction than male faculty members in the sciences. As with female faculty members, even though the hypothesis was not verified for overall job satisfaction, it was confirmed for two dimensions of satisfaction: degree of independence and job security.

In this study, we have primarily focused on analyzing job satisfaction by gender across disciplines while controlling for a variety of demographic, institutional, and career variables. Many have argued that it is important to study job satisfaction because it can directly impact faculty retention (Ambrose, Huston, & Norman, 2005; Johnsrud & Heck, 1994; Rausch, Ortiz, Douthitt, & Reed, 1989). However, caution should be used while interpreting these results because not all faculty members leave their jobs solely because lower satisfaction levels and, similarly, not all faculty members stay because of higher job satisfaction levels (Ambrose et al., 2005).

Analyzing satisfaction levels across disciplines can help university administrators, deans, and academic unit heads identify factors that contribute to the satisfaction/dissatisfaction of faculty across different colleges and schools. For instance, we would argue that special attention should to be paid to faculty of Asian, non-Hispanic, origin if university administrators are concerned about faculty satisfaction rates. Across all disciplines, Asian faculty members are

likely to express greater dissatisfaction with their jobs than their Caucasian peers. However, on a more positive front, this study found that African-American, non-Hispanic, faculty members were the most satisfied group of faculty among all ethnicities. In contrast to previous studies on gender and job satisfaction, we also found that female faculty members have higher (or equal) levels of satisfaction when compared to men. We observed this trend across all disciplines. We believe that this could be one indication of a narrowing gender gap in academe. In particular, higher levels of job satisfaction among females in the health and science disciplines are indicative of an environment that nurtures and promotes gender equality.

Satisfaction of faculty is also shown to be affected greatly by the institutional factors, such as leadership, collegial and student relationships, climate and culture of the university (Grunwald & Peterson, 2003; Hagedorn, 2000; Zhou & Volkwein, 2004). Relationships with colleagues, students and administrators, as well as perceptions of culture and climate of the institution, can significantly impact faculty job satisfaction (Hagedorn, 2000). Collegial relationships are often a source of support and a mechanism of building networking capability for faculty members (Astin & Davis, 1985; Hagedorn, 1996). Even though this dataset does not report these variables for individual faculty members, we believe that these are important factors for assessing the job satisfaction of women and minority faculty members in particular. Thus, in the future we plan to explore disciplinary differences in the collegiality, academic culture, leadership, and climate of the department.

These results suggest that using a measure of overall job satisfaction to implement policies for change might be misleading. Satisfaction varies not only by gender, but also by discipline. Lastly, we might be able to learn some important lessons from faculty members in the health and science disciplines because these are the areas where women have higher satisfaction than their male peers. We believe that the causes of these higher satisfaction rates for females should be further explored.

Note

3. For further details on data variables visit: http://sestat.nsf.gov/docs/columns.html#119.

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