SEX DIFFERENCES IN FACULTY TENURE AND PROMOTION: The Contribution of Family Ties

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This study uses data from the 1999 National Study of Postsecondary Faculty to examine the ways in which parental status, marital status, and employment status of the spouse are related to two outcomes, tenure and promotion, among college and university faculty. The analyses are guided by a conceptual model that draws upon the economic theory of human capital and sociological notions of structural capital, social capital, and social networks. Descriptive and multinomial logit analyses are used to address the research questions. The analyses reveal that the contribution of family ties to tenure status and academic rank is different for women than for men.

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KEY WORDS: faculty; human capital; marital and parental status; promotion; social networks; tenure.

INTRODUCTION

Women continue to be underrepresented among the nation's college and university faculty. In fall 1999, only 34% of all full-time faculty at four-year degree-granting institutions were women (National Center for Education Statistics, 2003). The representation of women varies by both institutional type and academic field, with women most severely underrepresented among full-time faculty at public and private research universities and in engineering and physical science disciplines (National Center for Education Statistics, 2003).

Women also continue to be underrepresented among the nation's tenured and highest ranking faculty. Not only is the share of women full-time faculty who hold tenured positions smaller than the share of men, but

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also the gender gap in tenure rates does not appear to be closing. In both 1992 and 1998, about 60% of men but only 40% of women full-time faculty reported holding tenured positions (Parsad and Glover, 2002). In 1999, only 18% of women, but 38% of men, full-time faculty held the rank of full professor (Bradburn and Sikora, 2002).

Married women and women with children are also underrepresented among the nation's faculty. Analyses of data from the National Study of Postsecondary Faculty (NSOPF:93) show that, in fall 1992, smaller percentages of women tenure track and non-tenure track faculty than of men tenure track and non-tenure track faculty were married (63% vs. 80%) and had at least one child (51% vs. 63%, Perna, 2001b).

Researchers have examined the extent to which marital and parental status contribute to salaries (Barbezat, 1988; Bellas, 1992; Johnson and Stafford, 1974; Toutkoushian, 1998), research productivity (Bellas and Toutkoushian, 1999; Creamer, 1998), and employment status (Ferber and Hoffman, 1997; Perna, 2001b) among college and university faculty. Other researchers have focused more specifically on the effects of having an academic spouse on such employment outcomes as research productivity, salaries, and academic rank (Astin and Milem, 1997; Creamer, 1998; Ferber and Hoffman, 1997). This study builds on prior research by using analyses of data from the 1999 National Study of Postsecondary Faculty (NSFOP:99) to examine the ways in which parental status, marital status, and employment status of the spouse are related to two outcomes, tenure and promotion, among college and university faculty.

THEORETICAL FRAMEWORK

Research (e.g., Perna, 2001a; Smart, 1991) shows the value of using a conceptual model that integrates aspects of economic and sociological theoretical perspectives to examine sex and racial/ethnic group differences in tenure and academic rank among college and university faculty. Such research typically integrates aspects of the economic theory of human capital with sociological notions about structural characteristics of academic labor markets. This study further expands this conceptual model to include aspects of social capital and social networks as a mechanism for understanding the ways in which structural characteristics influence labor market outcomes for women and men faculty.

According to the economic theory of human capital, an individual's status and rewards in the academic labor market are determined primarily by his or her productivity. Productivity is expected to be determined by the investments that individuals make in themselves, particularly the quantity and quality of their education and the amount of their on-the-job training,

as well as their geographic mobility, their motivation and intensity of work, and their emotional and physical health (Becker, 1962, 1993).

Some economists argue that marital and parental status influence investment in human capital, continuity of labor force participation, types of employment sought, and level of commitment to the job (Becker, 1985; Polachek, 1977). An individual who is out of the labor force because of family responsibilities is not acquiring additional on-the-job experience and may even be losing some previously acquired job skills, thereby reducing the individual's accumulation of human capital (Becker, 1993). Research shows that women are less mobile than men, suggesting that family responsibilities reduce geographic mobility (Marwell, Rosenfeld, and Spilerman, 1979; Rosenfeld and Jones, 1987). Family responsibilities may also be related to the level of motivation and intensity of work. Human capital theorists (e.g., Becker, 1985) predict that, compared with men and single women, married women pursue less demanding jobs, such as part-time and non-tenure track positions, because household responsibilities require more effort than leisure and other non-market activities and, consequently, they have less energy available for market work. Marriage and parenting responsibilities may also influence emotional and physical health, as research shows that childcare and other household responsibilities are a greater source of stress for women than for men faculty and that women perceive more conflict between work and family demands than men (Austin and Pilat, 1990; Dey, 1994; Sorcinelli and Near, 1989; Tack and Patitu, 1992).

Research provides some, although not consistent, support for economic claims about the relationship between family ties and such outcomes as academic rank and tenure status. Using data from the 1993 National Study of Postsecondary Faculty, Perna (2001b) found that parental and marital status were related to employment status among junior faculty and that the relationships were different for women than for men. Men appeared to benefit from having children, as men with at least one child were less likely to hold a full-time, non-tenure track position than they were to hold a full-time, tenure track position. As predicted by an economic perspective, women who were married were more likely to hold a part-time, non-tenure track position than a full-time tenure track position after controlling for other variables. Marital status was unrelated to employment status among men (Perna, 2001b). In contrast, a study of faculty in the state of Illinois showed that the number of children was unrelated to the probability of holding the rank of full professor among both women and men (Ferber and Hoffman, 1997).

Despite the popularity of human capital theory for explaining labor market experiences, some economists and sociologists have noted the

theory's limitations (DeYoung, 1989; Dreijmanis, 1991). Critics note that human capital theory does not adequately explain the lower returns to educational investments for women and minorities or the segregation of women into lower paying occupations (DeYoung, 1989; England, Farkas, Kilbourne, and Dou, 1988). Social scientists have responded to these criticisms by developing structural or institutional approaches to under-standing labor markets (Youn, 1988). Structural models posit that sex differences in the labor market experiences of faculty are attributable to the segregation of women in the types of institutions, academic fields, and work roles that have lower prestige and value (Smart, 1991).

Few studies have examined the relationship between the segregation of women in less prestigious institutions and less valued academic fields and such outcomes as tenure and rank. Although some (Barbezat, 1988) have concluded that the relationship is small in magnitude, research shows that the average salaries of faculty in institutions and disciplines with higher proportions of women are lower than the average salaries of faculty in institutions and disciplines with smaller proportions of women (Bellas, 1994, 1997; Perna, 2001c; Smart, 1991). Tolbert (1986) concluded that, when the minority group is smaller in size and relatively segregated within an organization, average differences in salaries are greater.

The concepts of social capital and social networks may provide an explanation for why women who are relatively segregated by institutional type and academic field realize lower returns for their investment in human capital. A primary function of social capital is to enable an individual to gain access to human and other forms of capital, as well as institutional resources and support (Lin, 2001a; Portes, 1998). Social capital is acquired through an individual's relationships with other individuals, particularly through membership in social networks and other social structures (Portes, 1998). Social capital, defined as an investment in social networks, benefits an individual by providing access to resources that are embedded in the networks (Lin, 2001b). Lin (2001b) identifies four types of resources that may be accessed and used to achieve such outcomes as tenure and promotion: information and knowledge about institutional norms, expectations, and opportunities; access to and influence on key decision makers; certification and endorsement of an individual's qualifications; and emotional support and recognition.

Research suggests that women faculty have less access than men faculty to the types of collegial and social networks that convey critical job-related knowledge and information (Aisenberg and Harrington, 1988; Clark and Corcoran, 1986; Milem, Sherlin, and Irwin, 2001; Tierney and Bensimon, 1996). Clark and Corcoran (1986) found in their exploratory case study of 12 tenured women at one research university that women may have

greater difficulty than men in obtaining mentors when they begin their faculty positions, especially when they work in academic fields and departments with relatively small numbers of women, and in being included in departmental networks of information. In their comprehensive study of the tenure and promotion experiences of more than 200 assistant professors at 12 colleges and universities in the early 1990s, Tierney and Bensimon (1996) showed that, with some exceptions, assistant professors generally received little formal or informal mentoring from senior colleagues at their institution. Mentoring was defined as providing criticism, feedback, advice, and assistance, as well as modeling appropriate behavior, sharing cultural norms, conveying professional information, and explaining historical context (Tierney and Bensimon, 1996). While concluding that both women and men junior faculty typically lacked information about tenure requirements and processes, Tierney and Bensimon (1996) also noted that women are more likely than men to feel excluded from social and professional networks. The absence of networks to help understand campus practices, structures and culture may be particularly common among women in academic fields in which most faculty are senior men (Tierney and Bensimon, 1996).

Based on their review and synthesis of prior research, Milem et al. (2001) concluded that women not only have less access than men to collegial networks, but also derive different types of resources from networks than men (Milem et al., 2001). Women tend to rely on collegial networks of peers to provide social and emotional support, whereas men tend to employ networks that include high-status individuals and use these networks to obtain job-related information and opportunities for professional advancement (Milem et al., 2001).

Some researchers (e.g., Astin and Milem, 1997; Milem et al., 2001) argue that, while gaining access to collegial networks is typically more difficult for women than men, having an academic spouse or partner may facilitate access to institutional and national networks and compensate for some of the inequities between women and men in the benefits of networks, the types of networks that are accessed, and the level of access to networks. Nonetheless, research examining the effects of an academic spouse or partner on academic rank is ambiguous. Ferber and Hoffman (1997) found that, among women faculty employed at colleges and universities in the state of Illinois in 1993, the probability of holding the rank of full professor was unrelated to such variables as geographic distance from the current partner and the number of years all partners were employed on the same faculty after controlling for other variables. The probability of holding the highest rank increased with the number of years spent with all partners for men but was unrelated for women (Ferber

and Hoffman, 1997). Although the findings may be limited by the use of OLS regression to examine a categorical dependent variable, Astin and Milem (1997) found that, among a sample of faculty employed at institutions nationwide in 1989, both women and men with academic spouses or partners held higher academic ranks than other faculty after controlling for other variables.

RESEARCH METHOD

This study uses descriptive and multivariate analyses to examine the extent to which family ties explain the lower observed representation of women among tenured faculty and full professors at four-year colleges and universities. Family ties are defined in terms of parental status, marital status, and employment status of the spouse. Human capital theory predicts that being married and having children contributes to lower rates of tenure and lower academic ranks, while social capital theory predicts that having a spouse or partner who is employed in higher education facilitates tenure and promotion in rank. The study examines the following research questions:

1. How does the distribution by tenure status and academic rank vary between women and men full-time faculty at four-year colleges and universities?
2. How do family ties contribute to the distribution of full-time faculty by tenure status and academic rank?
3. Do measures of family ties help explain the observed sex differences in the distribution of full-time faculty by tenure status and academic rank?
4. How does the relationship between family ties and the distribution of full-time faculty by tenure status and academic rank vary between women and men?

Data and Sample

This study uses data from the NSOPF:99 to address the research questions. Sponsored by the US Department of Education's National Center for Education Statistics, the NSOPF:99 is a nationally representative sample of college and university faculty and instructional staff who were employed by public and private non-proprietary higher education institutions in fall 1998. The NSOPF:99 employed a two-stage stratified sample design in which 960 institutions were first selected and then faculty within these institutions were selected.

The analytic sample is restricted to individuals with faculty status, who were employed full-time, and who had at least some for-credit instructional duties. Because research (Perna, 2001a) suggests that tenure and promotion processes are different at two-year than four-year institutions, the analytic sample is further limited to faculty who are employed at four-year institutions. The analyses also exclude American Indian/Alaskan Native faculty because of their small numbers ($n = 62$). The number of cases in the analytic sample is 8,982.

To correct for the oversampling of certain groups while minimizing the effects of large sample sizes on standard errors and tests of statistical significance, the normalized weight (WEIGHT divided by the average weight of the sample) is applied to the data. Because of the design effects of the NSOPF:99 that are associated with the nested nature of the data (i.e., faculty selected from within selected institutions), the results are interpreted using a rigorous threshold of statistical significance ($p < .001$, Thomas and Heck, 2001).

Variables

This study has two outcomes of interest: tenure status and academic rank. Tenure status has three categories: tenured, tenure track, and non-tenure track. Because of the small number, the 6% of faculty ($n = 504$) who work at an institution without a tenure system are excluded from the analyses of tenure status. Academic rank has four categories: full professor, associate professor, assistant professor, and other rank (e.g., instructor, lecturer). Again because of small numbers, the 1% of faculty with no rank are excluded from the analyses of academic rank.

The independent variables include measures of sex, race, human capital, productivity, structural characteristics, and family ties. Four racial/ethnic groups are considered: Black, Hispanic, Asian, and White (reference group).

Human capital is accumulated via educational attainment, on-the-job training, experience, and mobility (Becker, 1962). Educational attainment is measured by whether the faculty member holds a doctoral degree (yes or no). On-the-job training is measured by the number of years in the current position, while experience is measured by the number of years since receiving the highest degree (correlation = .405). Mobility is measured by the number of positions in higher education that an individual has held during his/her career: one, two or three, or four or more.

Productivity is an indicator of an individual's human capital (Becker, 1962). Research productivity is measured by the total number of "creative

works in juried media'' over the course of the career, standardized by academic field and institutional type. To control for variations in publication norms and expectations across different types of academic fields and institutions, the total number of refereed creative works is measured relative to the average number of creative works in juried media among faculty who work in the same academic field and type of college or university, and then transformed to correct for the positively skewed distribution (Fairweather, 1996). The analyses also control for the number of grants on which a faculty member is the principal or co-principal investigator: none, one, or two or more.

Two other measures, engagement in collaborative research and involvement in professional conferences, may reflect research productivity as well as the availability of national networks. Engagement in collaborative research is measured by the number of recent ''joint creative works in juried media.'' Because of the non-normal distribution, the variable is recoded into the following categories: none, 1 to 2, 3 to 5, and 6 or more. The number of recent sole and joint presentations and performances is the best available proxy for an individual's participation in professional organizations. Because of the non-normal distribution, the continuous variable is recoded into the following roughly equal size categories: none, 1 to 3, 4 to 9, and 10 or more.

Teaching, service, and administrative productivity are measured by the shares of time spent on each. To correct for the non-normal distributions, each continuous variable is recoded into roughly equal-size categories. Percent of time spent on teaching has four categories: 5% or less, 6–35%, 36–65%, and 66% or more. Percent of time on service has three categories: none, less than 10%, and at least 10%. Percent of time spent on administrative activities has four categories: none, 10% or less, 11–20%, and more than 20%.

Structural characteristics are measured by the type of institution and academic field in which a faculty member works. Institutional type is measured by a four-category variable: public doctoral university, private doctoral university, public non-doctoral college, and private non-doctoral college.

This study controls for the segregation of women by academic field and the level of access to women in high-status positions within the field with a variable that reflects the representation of tenured women among full-time faculty at four-year institutions in the academic discipline. Descriptive analyses show that the percentage of full-time faculty at four-year colleges and universities who are tenured women varies by academic field, ranging from 3% in engineering and 5% in computer science to 26% in non-teacher education and 38% in nursing. The percentage of full-time faculty

in the field who are tenured women is included in the analyses as a continuous, z-scored variable.

Family ties are measured by parental status, marital status, and employment status of the spouse or partner. Parental status is measured by the number of dependents, ranging from 0 to 4 or more. Marital status and spouse/partner employment status are measured by a composite indicator. The variable has five categories: married or living in a marriage-like relationship with spouse/partner employed at the same institution; married or living in a marriage-like relationship with spouse/partner employed at another higher education institution; married or living in a marriage-like relationship with spouse/partner not employed in higher education (i.e., employed in non-higher education institution or not employed); separated, divorced, or widowed; and single, never married (reference category).

Analyses

Both descriptive and multivariate analyses are used to address the research questions. Descriptive analyses examine differences in the distribution of faculty by tenure status and academic rank based on sex and family ties and differences in family ties between women and men faculty.

Because both of the dependent variables are categorical, multinomial logit analysis is used. Multinomial logit models estimate the log-odds of one outcome occurring relative to the baseline category after controlling for other variables in the model. In the analyses of tenure status, holding a tenure-track position and holding a non-tenure track position are simultaneously contrasted to holding a tenured position. In the analysis of academic rank, the likelihood of holding the ranks of associate professor, assistant professor, and other is simultaneously contrasted to the likelihood of holding the rank of full professor (the reference category).

The logistic coefficients that result from the multinomial logit analyses may be interpreted as the change in log odds that is associated with a one-unit change in each independent variable. The interpretation of the multinomial logit coefficients is facilitated by the use of odds-ratios. The odds-ratio represents the change in the odds of holding a particular status relative to the reference status (e.g., tenured position or full professor) that is associated with a one-unit change in a particular independent variable. An odds-ratio greater than one represents an increase in the likelihood of a particular category (e.g., assistant professor) relative to the reference category (e.g., full professor), whereas an odds-ratio less than one represents a decrease in the likelihood.

The four continuous variables (number of years in the current position, number of years since receiving the highest degree, number of creative works in juried media relative to other faculty working in the same academic field and at the same type of institution, and percentage of tenured women in the academic discipline) are entered into the model as covariates. The Wald statistic, calculated as the coefficient divided by its standard error, squared, is used to determine whether a coefficient is different from zero. The Cox and Snell pseudo-R^2 provides an indication of the strength of the relationship between the outcome variable and the independent variables.

Limitations

This examination of the relationship between family ties and the two outcomes, tenure and rank, is limited by the variables that are available in the NSOPF:99. The dataset includes a limited number of variables that describe the characteristics of the spouse or partner, with no information about the number of years spent with a spouse or partner, number of years spent with a spouse or partner at the same institution, spouse's or partner's pattern of labor market participation, educational attainment and academic discipline of the spouse or partner, current rank and tenure status of the spouse or partner, or whether a spouse or partner who is "employed in higher education" holds a faculty position. The dataset also lacks information about the distribution of household and parental responsibilities, ages of dependent children, and other care-giving responsibilities including care of one's parents. Finally, the dataset does not contain variables that describe the history or changing nature of parental and family responsibilities, including information about time spent out of the labor force for childbearing and childrearing.

The notion of collegial and social networks is useful for understanding why the employment status of a spouse or partner may be related to such outcomes as tenure and rank. Nonetheless, with the exception of employment status of the spouse, the analyses are limited by the absence of proxies for departmental, institutional, and national networks. Faculty collegial and social networks may be local, focusing on departmental and institutional relations, and national, focusing on relations with individuals in the same academic discipline at other institutions and organizations (Milem et al., 2001). Collegial networks that operate within an institution serve to socialize faculty to institutional and departmental norms and expectations, while networks that operate across an academic discipline facilitate research productivity and provide intellectual support (Milem et al., 2001).

The analyses are also limited by the use of cross-sectional data to describe longitudinal tenure and promotion processes. One implication of this limitation is that only individuals who were employed as faculty at the time of the data collection are included in the analyses. A second implication of cross-sectional data is that the variables describe conditions at one point in time. The number of career-refereed publications may not accurately reflect the individual's cumulative productivity at the time of the tenure or promotion decision, a variable that is unavailable in the database. The measures of family ties also reflect the faculty member's status in fall 1998, rather than at the time of the tenure and promotion decisions. Thus, this study focuses on understanding relationships between family ties and the two outcomes at one point in time, rather than on drawing conclusions about causality.

FINDINGS

Sex Differences in the Distribution of Faculty by Tenure Status and Academic Rank

Table 1 shows that the observed distribution of faculty by tenure status and academic rank is different for women and men. Among faculty at four-year colleges and universities with a tenure system, a smaller share of women than men hold tenured positions (44% vs. 66%). Higher shares of women than men hold tenure track positions (27% vs. 19%) and non-tenure track positions (29% vs. 16%).

The multinomial logit analyses, as summarized in Table 2,[1] reveal that, even after controlling for race, human capital, productivity, social networks, and family ties, the odds of holding a non-tenure track position rather than a tenured position are higher for women than for men (odds-ratio = 1.41). Women appear to be as likely as men to hold tenure track positions (odds-ratio = 1.20, $p > .001$) after controlling for other variables.

Women are also relatively underrepresented among the highest-ranking faculty at four-year institutions. Table 1 shows that a substantially smaller share of women than men hold the rank of full professor (19% vs. 42%). While comparable shares of women and men hold the rank of associate professor (27%), higher shares of women than men hold the lower ranks of assistant professor (35% vs. 22%) and instructor, lecturer, or other rank (20% vs. 9%).

As with tenure status, the observed sex differences in academic rank are not completely explained by sex differences human capital, productivity,

TABLE 1. Observed Distribution of Faculty at Four-year Institutions by Sex and Selected Characteristics: Fall 1998

Characteristic	Total	Male	Female	Effect Size
Tenure Status				$\phi = 0.23$
Total	100.0	100.0	100.0	
Tenured	58.7	65.8	43.9	
Tenure Track	21.2	18.6	26.7	
Non-Tenure Track	20.1	15.6	29.4	
Academic Rank				$\phi = 0.21$
Total	100.0	100.0	100.0	
Full Professor	34.2	41.6	18.8	
Associate Professor	27.3	27.4	27.1	
Assistant Professor	25.9	21.7	34.6	
Other	12.7	9.4	19.6	
Number Dependents				$\phi = 0.21$
Total	100.0	100.0	100.0	
0	37.0	30.4	50.7	
1	22.9	24.0	20.4	
2	20.0	20.6	18.7	
3	12.9	15.8	6.8	
4 or More	7.2	9.1	3.3	
Marital and Spouse/Partner				$\phi = 0.25$
Employment Status				
Total	100.0	100.0	100.0	
Spouse Employed at Same Institution	13.3	13.1	13.6	
Spouse employed, Other Higher Education Institution	7.3	7.1	7.8	
Spouse, Other	57.4	63.4	45.0	
Separated, Divorced, Widowed	9.9	7.3	15.3	
Single, Never Married	12.1	9.0	18.4	

Notes: Analyses of tenure status exclude faculty at institutions with no tenure system. Analyses of academic rank exclude faculty with no rank. The effect size column shows the strength of the relationship and is calculated using the following formula: $\phi = \sqrt{(\chi^2/n)}$. A ϕ that is below 0.3 represents a "small" effect size; a ϕ that is greater than 0.5 is "large." *Source*: Analyses of NSOPF:99.

social networks, and family ties. Table 3 shows that the odds of holding the rank of assistant professor and the rank of instructor, lecturer, or other rank rather than the rank of full professor are higher for women than for men (odds-ratios = 1.46 and 1.76, respectively) even after controlling for other variables.

TABLE 2. Odds-ratios for Tenure Status of Women and Men Full-time Faculty at Four-year Institutions: Fall 1998

Independent Variable	Tenure Track			Non-Tenure Track		
	Total	Women	Men	Total	Women	Men
Female	1.20*			1.41***		
(Male)						
Asian	1.28	1.05	1.43*	1.08	0.75	1.30
Black	1.24	1.43	1.10	1.00	1.12	0.93
Hispanic	0.85	1.19	0.64	0.97	1.36	0.67
(White)						
Doctoral Degree	0.69***	0.87	0.60***	0.20***	0.24***	0.17***
(Other Degree)						
Years Since Highest Degree	0.42***	0.43***	0.41***	0.65***	0.67***	0.64***
Years Current Position	0.04***	0.05***	0.04***	0.19***	0.18***	0.18***
1 Position Higher Ed.	1.14	0.91	1.34	0.90	1.13	0.79
2–3 Positions (4 or More)	0.97	0.70	1.23	0.92	1.12	0.79
Creative Works	0.40***	0.33***	0.43***	0.20***	0.17***	0.23***
Not PI	1.00	1.05	0.88	1.76***	1.41	1.90***
PI on 1 Project	0.99	0.84	1.07	1.43*	1.08	1.71**
(PI 2+ Projects)						
No Recent Joint Refereed	0.90	0.71	0.95	0.62**	0.53*	0.68
1–2 Joint Refereed	1.43*	1.12	1.60*	1.10	0.97	1.13
3–5 Joint Refereed	1.60**	1.21	1.79**	1.05	0.83	1.21
(6 or More Joint Refereed)						
No Presentations	1.03	0.73	1.32	2.17***	2.48***	1.95***
1–3 Recent Presentation	0.88	0.88	0.91	1.18	1.57*	0.96
4–9 Recent Presentation	1.17	1.22	1.18	1.02	1.20	0.96
(10+ Recent Presentation)						
Time Teach: 5% or Less	0.74*	0.52**	0.99	1.02	0.72	1.35
6–35%	0.53***	0.36***	0.73	0.54***	0.42***	0.68*

TABLE 2. (*Continued*)

Independent Variable	Tenure Track			Non-Tenure Track		
	Total	Women	Men	Total	Women	Men
36–65%	0.79	0.71	0.87	0.55***	0.50***	0.62**
(66% +)						
Time Service: 0%	0.67***	0.86	0.58***	1.05	1.05	1.12
Less than 10%	0.92	0.86	0.94	0.94	0.98	0.90
(10% or More)						
Time Administration: 0%	1.67***	1.26	2.17***	1.47**	1.92**	1.21
1–10%	2.45***	2.19***	2.86***	1.21	1.34	1.16
11–20%	1.66***	1.45	1.90**	0.76	0.71	0.81
(More than 20%)						
Public Doctoral	0.61***	0.74	0.51***	1.51***	1.70**	1.34
Private Doctoral	0.97	1.00	0.89	2.36***	2.39***	2.26***
Public College	0.51***	0.48***	0.55***	0.60***	0.50***	0.67*
(Private College)						
% Tenured Women in Field	0.90*	0.81***	1.07	0.98	0.92	1.06
No Dependents	1.68**	1.64	1.97**	2.10***	1.13	3.15***
1	1.61**	1.79	1.59*	1.77**	1.28	1.97**
2	1.04	1.37	0.92	1.12	0.91	1.13
3	1.38	2.18	1.20	1.28	1.15	1.34
(4 or More)						
Spouse at Same Institution	0.86	1.06	0.77	0.91	1.29	0.72
Spouse in Higher Ed.	1.21	1.17	1.29	1.18	1.33	1.06
Spouse, Other	1.11	1.12	1.17	1.09	1.11	1.09
Separated, Divorced, Widowed	1.35	1.29	1.54	0.93	0.93	0.92
(Never Married)						

Notes: Tenure status is relative to holding a tenured position. Reference categories are shown in parentheses.
***$p < .001$, **$p < .01$, *$p < .05$.
Source: Analyses of 1999 National Study of Postsecondary Faculty (NSOPF:99).

TABLE 3. Odds-ratios for Academic Rank of Women and Men Faculty at Four-year Colleges and Universities: Fall 1998

Independent Variable	Associate			Assistant			Other		
	Total	Women	Men	Total	Women	Men	Total	Women	Men
Female	1.28**			1.46***			1.76***		
(Male)									
Asian	1.20	1.13	1.21	1.41*	1.30	1.45*	1.42	1.29	1.43
Black	1.36	2.01*	1.15	1.75**	2.82**	1.34	1.06	1.28	1.06
Hispanic	0.62*	0.57	0.59*	0.77	0.80	0.63	1.15	0.96	1.18
(White)									
Doctoral Degree	0.43***	0.50***	0.40***	0.22***	0.22***	0.21***	0.06***	0.06***	0.07
(Other Degree)									
Years Highest Degree	0.39***	0.43***	0.38***	0.20***	0.22***	0.19***	0.21***	0.24	0.21***
Years Current Position	0.68***	0.55***	0.71***	0.19***	0.17***	0.18***	0.31***	0.20	0.36***
1 Position Higher Ed.	1.32*	1.80**	1.20	1.73***	2.27***	1.59**	1.33*	1.79*	1.20
2–3 Positions	1.47***	2.16***	1.30*	1.54**	2.30***	1.32	1.44*	2.85***	1.03
(4 or More)									
Creative Works	0.46***	0.41***	0.45***	0.17***	0.14***	0.17***	0.15***	0.09	0.19***
Not PI	1.05	1.01	1.05	1.17	1.06	1.16	2.32***	1.75	2.46***
PI on 1 Project	1.01	0.94	1.00	1.18	0.78	1.48*	1.24	0.94	1.36
(PI 2+ Projects)									
No Recent Joint Refereed	1.30*	0.34***	0.64**	0.97	0.25***	0.68*	1.20	0.13***	0.66*
1–2 Joint Refereed	1.49***	0.43***	0.71**	1.74***	0.25***	0.51***	1.45	0.13***	0.67
3–5 Joint Refereed	1.26	0.57**	0.89	1.39*	0.44***	0.85	1.02	0.23***	0.70
(6 or More Joint Refereed)									
No Presentations	1.45***	0.68*	0.97	1.78***	0.77	0.92	3.07***	1.52	1.99***
1–3 Recent Presentation	1.41***	0.60**	1.04	1.64***	0.59**	0.96	1.72***	0.80	1.65**
4–9 Recent Presentation	1.13	1.33	1.55**	1.34**	2.58**	2.71**	1.19	2.08*	1.53*
(10+ Recent Presentation)									
Time Teach: 5% Less	0.57***	1.17	1.37**	0.52***	2.47***	2.56***	0.36***	0.83	0.83
6–35%	0.64***	0.70	1.33*	0.41***	1.14	1.82**	0.36***	0.43***	0.47**

TABLE 3. *(Continued)*

Independent Variable	Associate			Assistant			Other		
	Total	Women	Men	Total	Women	Men	Total	Women	Men
36–65%	0.80*			0.70**	0.39**	1.29	0.44***	0.48	1.57
(66% +)		0.52**	1.70***						
Time Service: 0%	0.90	1.16	1.50**	0.92	1.29	1.84**	1.87***	1.40	1.25
Less than 10%	0.91	0.79	1.36*	0.87	0.87	1.55*	1.35*	0.56	1.21
(10% or More)									
Time Admin.: 0%	1.50***	1.39	1.48**	2.67***	1.69*	1.82***	1.73***	3.56***	2.72***
1–10%	1.30**	1.26	1.52***	2.52***	1.64*	1.64**	0.83	2.12**	1.51
11–20%	1.14	0.98	1.20	1.63**	1.20	1.45**	0.50***	1.59	0.87
(More than 20%)									
Public Doctoral	1.73***	1.63**	1.78***	1.63***	1.69*	1.66*	4.40***	6.56***	3.29***
Private Doctoral	1.38**	1.16	1.42*	1.28	1.14	1.33	3.45***	5.61***	2.20**
Public College	1.08	1.07	1.06	1.12	1.00	1.25	1.87***	2.40***	1.55*
(Private College)									
% Women in Field	0.99	1.02	0.94	0.99	0.96	1.03	1.05	0.97	1.21*
No Dependents	0.81	1.19	0.66**	1.46*	1.79	1.29	1.76**	1.88	1.99**
1	0.91	1.14	0.85	1.40*	1.80	1.29	1.74*	2.67*	1.36
2	0.85	1.06	0.79	1.13	1.28	1.05	1.32	1.55	1.15
3	0.87	1.34	0.80	1.02	1.65	0.93	1.49	3.56*	1.15
(4 or More)									
Spouse at Institution	0.76	0.83	0.63*	0.59**	0.92	0.36***	0.51**	0.87	0.30***
Spouse in Higher Ed.	0.78	0.68	0.69	0.67	0.84	0.44**	0.94	0.85	0.88
Spouse, Other	0.73*	1.19	0.53***	0.65	1.27	0.39***	0.59**	1.09	0.42***
Separated, Divorced	0.95	1.24	0.76	0.91	1.39	0.63	0.86	1.37	0.58
(Never Married)									

Notes: Academic rank is relative to full professor. Reference categories are shown in parentheses.
***p < .001, **p < .01, *p < .05.
Source: Analyses of 1999 National Study of Postsecondary Faculty (NSOPF:99).

Contribution of Family Ties to the Distribution of Faculty by Tenure Status and Academic Rank

Table 4 shows that the distribution of faculty by tenure status is related to parental status and marital employment status, but that the effects are small in magnitude ($\phi = .08$ and $\phi = .13$, respectively). Somewhat smaller percentages of tenured than tenure track and non-tenure track faculty have no dependents (34% vs. 41%) and have never been married (9% vs. 18% and 16%, respectively). Similarly, Table 5 shows that smaller shares of full and associate professors than of assistant professors and faculty with other rank have no dependents (about 33% vs. 42%). Only 7% of full professors have never been married, compared with 18% of assistant professors.

The chi-square tests for the likelihood ratios suggest that even after controlling for human capital, productivity, and social networks, the number of dependents is a statistically significant predictor of tenure status (Table 6) but that neither the number of dependents nor marital/employment status is a statistically significant predictor of rank at the

TABLE 4. Distribution of Full-time Faculty at Four-year Colleges and Universities by Tenure Status and Family Ties: Fall 1998

Characteristic	Total	Tenured	Tenure Track	Non-Tenure Track	Effect Size
Number Dependents					
Total	100.0	100.0	100.0	100.0	$\phi = 0.08$
0	37.2	34.2	41.3	41.3	
1	22.9	24.9	19.9	20.0	
2	20.0	20.7	18.4	19.9	
3	12.9	12.9	13.4	12.5	
4 or More	7.0	7.3	7.0	6.2	
Marital/Spouse Status					
Total	100.0	100.0	100.0	100.0	$\phi = 0.13$
Spouse Employed at Same Institution	13.6	14.9	11.8	11.9	
Spouse Employed at Other Institution	7.3	7.4	6.9	7.3	
Spouse, Other	57.1	59.1	52.5	56.0	
Separated, Divorced, Widowed	10.1	10.0	11.2	9.2	
Single, Never Married	11.9	8.6	17.6	15.7	

Notes: Analyses limited to faculty employed at an institution with a tenure system. The effect size column shows the strength of the relationship and is calculated using the following formula: $\phi = \sqrt{(\chi^2/n)}$. A ϕ that is below 0.3 represents a "small" effect size; a ϕ that is greater than 0.5 is "large." *Source*: Analyses of NSOPF:99.

TABLE 5. Distribution of Full-Time Faculty at Four-Year Colleges and Universities by Academic Rank and Family Ties: Fall 1998

Characteristic	Total	Full Professor	Associate Professor	Assistant Professor	Other	Effect Size
Number Dependents						
Total	100.0	100.0	100.0	100.0	100.0	$\phi = 0.12$
0	37.0	34.5	32.4	42.1	43.0	
1	22.8	27.2	21.7	19.6	19.9	
2	20.0	19.5	21.4	19.6	19.3	
3	12.9	12.1	15.1	11.8	12.5	
4 or More	7.3	6.7	9.4	6.9	5.2	
Marital/spouse status						
Total	100.0	100.0	100.0	100.0	100.0	$\phi = 0.16$
Spouse Employed at Same Institution	13.3	14.3	14.9	11.9	9.8	
Spouse employed at Other Institution	7.4	7.6	7.5	6.1	9.0	
Spouse, Other	57.4	62.2	57.1	53.1	53.5	
Separated, Divorced, Widowed	10.0	9.2	10.1	10.5	10.5	
Single, Never Married	12.1	6.7	10.4	18.4	17.3	

Notes: Analyses exclude faculty with no rank. The effect size column shows the strength of the relationship and is calculated using the following formula: $\phi = \sqrt{(\chi^2/n)}$. A ϕ that is below 0.3 represents a "small" effect size; a ϕ that is greater than 0.5 is "large." *Source*: Analyses of NSOPF:99.

$p < .001$ level[2] (Table 7). Table 2 shows that, contrary to the predictions of human capital theory, faculty who have no dependents are more likely than faculty with four or more dependents to hold a non-tenure track position than a tenured position (odds-ratio = 2.10).

Contribution of Family Ties to Explaining Observed Sex Differences in Tenure and Rank

Table 1 shows that the distribution of faculty by family ties is different for women than for men. Only 49% of women faculty have at least one dependent, compared with 70% of men faculty. About one-fourth of men faculty, but only 10% of women faculty, report having at least three dependents. Comparable shares of women and men have a spouse who is employed at the same higher education institution (about 13%) or at

TABLE 6. Likelihood Ratios for Predictors of Tenure Status among Full-time Faculty at Four-year Colleges and Universities: Fall 1998

Variable	Total Model 1			Total Model 1 + Family Ties			Women			Men		
	−2 Log Likelihood	Chi Square	df	−2 Log Likelihood	Chi Square	df	−2 Log Likelihood	Chi Square	df	−2 Log Likelihood	Chi Square	df
Female	9,388	28.4	2***	9,311	16.2	2***						
Race	9,365	5.7	6	9,301	6.1	6	3,646	5.1	6	5,522	8.5	6
Highest Degree	9,729	369.1	2***	9,679	384.7	2***	3,762	121.2	2***	5,768	255.0	2***
Years Since Degree	9,537	177.2	2***	9,483	188.5	2***	3,696	54.7	2***	5,645	132.1	2***
Years in Position	10,970	1,610.6	2***	10,918	1,623.3	2***	4,191	550.6	2***	6,564	1,050.7	2***
Number Positions	9,366	6.5	4	9,301	6.3	4	3,648	6.8	4	5,525	12.2	4*
Creative Works	9,576	216.3	2***	9,501	206.1	2***	3,738	96.8	2***	5,622	109.2	2***
PI on any Project	9,388	28.4	4***	9,321	26.5	4***	3,645	4.6	4	5,540	27.0	4***
Collaborative Research	9,400	40.1	6***	9,338	43.2	6***	3,656	15.1	6*	5,543	29.5	6***
Presentations	9,447	87.4	6***	9,382	87.4	6***	3,705	63.8	6***	5,548	34.7	6***
Time on Teaching	9,439	79.2	6***	9,377	81.9	6***	3,681	40.2	6***	5,554	40.6	6***
Time on Service	9,392	32.0	4***	9,325	30.4	4***	3,643	1.7	4	5,554	40.5	4***
Time on Administration	9,459	99.9	6***	9,392	97.5	6***	3,704	62.9	6***	5,566	52.6	6***
Institutional Type	9,508	148.2	6***	9,446	151.7	6***	3,721	79.7	6***	5,590	76.8	6***
Women in Field	9,365	5.3	2	9,301	6.3	2*	3,654	13.2	2**	5,514	1.1	2
Number dependents				9,342	47.6	8***	3,648	7.0	8	5,574	61.1	8***
Marital Employ. Status				9,309	14.3	8	3,647	6.7	8	5,531	17.4	8*
Number of Cases	8,451			8,451			2,726			5,725		

TABLE 6. (*Continued*)

Variable	Total Model 1			Total Model 1 + Family Ties			Women			Men		
	−2 Log Likelihood	Chi Square	df	−2 Log Likelihood	Chi Square	df	−2 Log Likelihood	Chi Square	df	−2 Log Likelihood	Chi Square	df
Cox & Snell Pseudo R^2	0.559			0.562			0.555			0.548		
% Correct Predicted	78.0%			77.9%			73.7%			82.1%		
% Tenured	91.1%			91.0%			84.0%			94.3%		
% Tenure Track	68.3%			68.3%			71.8%			69.0%		
% Non-Tenure Track	49.9%			49.7%			60.0%			46.2%		

Note: Analyses of tenure status exclude faculty at institutions with no tenure system.
***$p < .001$, **$p < .01$, *$p < .05$.
Source: Analyses of NSOPF:99.

TABLE 7. Likelihood Ratios for Predictors of Academic Rank among Full-time Faculty at Four-year Colleges and Universities: Fall 1998

Variable	Total Model 1			Total Model 1 + Family Ties			Women			Men		
	−2 Log Likelihood	Chi Square	df	−2 Log Likelihood	Chi Square	df	−2 Log Likelihood	Chi Square	df	−2 Log Likelihood	Chi Square	df
Female	16,202	46.8	3***	16,105	27.5	3***						
Race	16,185	30.7	9***	16,108	30.3	9***	5,519	22.7	9**	10,330	16.2	9
Highest Degree	16,730	575.1	3***	16,665	587.4	3***	5,726	230.3	3***	10,662	348.3	3***
Years Since Degree	16,899	744.4	3***	16,809	731.3	3***	5,666	170.4	3***	10,848	534.3	3***
Years in Position	16,816	660.7	3***	16,737	659.8	3***	5,750	253.7	3***	10,729	415.5	3***
Number Positions	16,189	34.1	6***	16,113	35.3	6***	5,530	33.9	6***	10,331	16.5	6*
Creative Works	16,455	299.7	3***	16,374	296.2	3***	5,620	124.2	3***	10,504	189.9	3***
Collaborative Research	16,199	43.7	9***	16,122	44.2	9***	5,535	38.6	9***	10,348	33.6	9***
Presentations	16,242	87.2	9***	16,163	85.7	9***	5,529	32.8	9***	10,376	62.3	9***
PI on any Project	16,196	41.5	6***	16,116	38.5	6***	5,506	10.1	6	10,345	31.2	6***
Time on Teaching	16,238	83.0	9***	16,158	80.9	9***	5,573	77.2	9***	10,344	30.0	9***
Time on Service	16,208	52.8	6***	16,128	50.7	6***	5,529	32.6	6***	10,342	28.5	6***
Time on Administration	16,330	174.8	9***	16,250	172.2	9***	5,583	87.0	9***	10,410	95.9	9***
Institutional Type	16,303	148.6	9***	16,224	146.8	9***	5,599	102.8	9***	10,376	62.1	9***
Women in Field	16,157	2.6	3	16,080	2.7	3	5,497	1.4	3	10,326	12.4	3**
Number Dependents				16,112	34.5	12**	5,516	19.7	12	10,356	42.3	12***
Marital Employ. Status				16,105	28.1	12**	5,507	11.1	12	10,363	49.1	12***
Number of Cases	8,884			8,884			2,880			6,004		
Cox & Snell Pseudo R^2	0.571			0.575			0.551			0.563		

TABLE 7. (*Continued*)

Variable	Total Model 1 −2 Log Likelihood	Chi Square	df	Total Model 1 + Family Ties −2 Log Likelihood	Chi Square	df	Women −2 Log Likelihood	Chi Square	df	Men −2 Log Likelihood	Chi Square	df
% Correct Predicted	62.8%			62.8%			60.7%			65.3%		
% Full Professor	78.4%			78.4%			60.0%			84.2%		
% Assistant Professor	74.0%			73.1%			72.3%			73.4%		
% Other Rank	39.1%			39.7%			50.2%			32.7%		
% Associate Professor	43.5%			44.1%			53.9%			41.4%		

Note: Analyses of rank exclude faculty with no academic rank.
***$p < .001$, **$p < .01$, *$p < .05$.
Source: Analyses of NSOPF:99.

different higher education institution (about 7%). But, substantially higher proportions of women than men are separated, divorced, or widowed (15% vs. 7%) and single, never been married (18% vs. 9%).

To examine the extent to which sex differences in family ties help explain observed sex differences in the distribution of faculty by tenure status and academic rank, measures of family ties were added to a multinomial logit analysis that already controlled for race, human capital, and structural characteristics. An examination of the change in the odds-ratios for female provides an indication of the ways in which family ties help to explain the observed sex differences in tenure and rank.

A review of the change in odds-ratios (available from the author upon request) suggests that adding measures of family ties to the model does not explain the observed sex differences in the distribution of faculty by tenure status. Adding measures of family ties to a model for tenure status that includes measures of human capital, productivity, and structural characteristics does not alter the magnitude, or level of statistical significance, of the odds-ratios for female. In the examination of academic rank, adding measures of family ties to the model somewhat reduces the odds that a woman holds the rank of associate professor rather than full professor from a statistically significant ($p < .001$) 1.36 to a statistically insignificant ($p < .01$) 1.28.

Variations in the Relationship between Family Ties and the Distribution of Faculty by Tenure Status and Academic Rank by Sex

Differences in the likelihood ratios that are statistically significant for women and men suggest that the predictors of tenure status are different for women than for men (Table 6). Most relevant to this study, parental status is a statistically significant predictor of tenure status for men but is unrelated for women. Table 2 shows that men who have no dependents are more likely than men who have four or more dependents to hold a non-tenure track position rather than tenured position (odds ratio = 3.15) after controlling for other variables. Marital/employment status is unrelated to tenure status for men or women net of other variables.

Similarly, differences in the likelihood ratios for academic rank that are statistically significant (Table 7) suggest that the predictors of rank also vary between women and men. Again focusing only on the variables that are of primary interest to this study, both parental status and marital/employment status are statistically significant predictors of academic rank for men but are unrelated for women. Although Table 7 shows that the likelihood ratio for parental status is a statistically significant predictor for men at the $p < .001$ level, Table 3 shows that the odds-ratios for parental

status are significant for men at no more than the $p < .01$ level. The odds-ratios suggest that, compared with men who have four or more dependents, men who have no dependents are more likely to hold the rank of instructor, lecturer or other (odds-ratio = 1.99) and less likely to hold the rank of associate professor (odds-ratio = 0.66) than to hold the rank of full professor. Table 3 also shows that men who have spouses who are employed at the same institution are less likely than men who were never married to hold the ranks of assistant professor and instructor, lecturer, or other than they are to hold the rank of full professor (odds-ratios = 0.36 and 0.30, respectively). Men who have a spouse who is not employed in higher education are less likely than men who were never married to hold the ranks of associate professor, assistant professor, or instructor, lecturer, or other than the rank of full professor (odds-ratios = 0.53, 0.39, and 0.42, respectively).

DISCUSSION

At least four conclusions may be drawn from this research. First, although the effects are not "large" in magnitude (Table 1), the analytic model does not completely explain the observed sex differences in the distribution of faculty by tenure status or academic rank. Even after controlling for measures of human capital, productivity, structural characteristics, and family ties, women are more likely than men to hold a non-tenure track position than a tenured position. This finding is consistent with other research showing that women full-time faculty at four-year colleges and universities are less likely than their male counterparts to hold tenured positions after controlling for other variables (Toutkoushian, 1999). Similarly, this study shows that the observed concentration of women among faculty holding the rank of assistant professor and the ranks of instructor, lecturer, or "other" are not completely explained by sex differences in other variables in the model. The unexplained sex difference in academic rank is consistent with the results of other research (Broder, 1993; Perna, 2001a; Ransom and Megdal, 1993; Rosenfeld and Jones, 1987; Smart, 1991; Toutkoushian, 1999; Weiler, 1990).

The finding that observed sex differences in tenure and rank are not eliminated when sex differences in measures of human capital, productivity, social networks, and family ties are taken into account suggests either that the analytic model excludes or does not adequately measure all of the relevant variables (Perna, 2001a; Toutkoushian, 1999) and/or that institutional structures, policies, and practices disadvantage women but not men in the determination of tenure and rank (Johnsrud and

Des Jarlais, 1994; Tierney and Bensimon, 1996). Based on their qualitative examination of the promotion and tenure experiences of assistant professors, Tierney and Bensimon (1996) concluded that institutional structures, policies, and practices that are intended to be gender-neutral may be creating a working environment that is unsupportive, patronizing, and even hostile to women faculty. Johnsrud and Des Jarlais (1994) used descriptive analyses to show that women faculty at one institution perceive structural discrimination (e.g., institutional sex discrimination, support for research on gender, childbearing leave policy) and personal discrimination (e.g., sex-role stereotyping, sexual harassment, sex discrimination) to be greater barriers to tenure than men faculty.

Second, measures of family ties are related to tenure status and academic rank, but the contribution of family ties to tenure status and academic rank is different for women than for men. Contrary to expectations based on economic and social capital perspectives, having dependents and having a spouse or partner employed at the same institution were both unrelated to tenure and rank among women faculty at four-year institutions in fall 1999. In contrast, men appear to benefit in terms of their tenure status and academic rank from having dependents and in terms of their academic rank from being married. Compared to men with four or more dependents, men without dependents are substantially more likely to hold non-tenure track than tenured positions and more likely to hold the lowest academic ranks of instructor, lecturer, and ''other'' than the highest rank of full professor. Men with a spouse or partner who is employed at the same institution are less likely than men who never married to hold the lowest ranks of assistant professor and instructor, lecturer, or other rank than they are to hold the highest rank of full professor. Moreover, men with a spouse or partner who is not employed in higher education are less likely than men who never married to hold the ranks of associate professor, assistant professor, and other than the rank of full professor.

The finding that family ties are associated with improved employment outcomes for men but are unrelated to employment outcomes for women is consistent with prior research. Research shows that married men faculty benefit from having wives or partners in terms of their productivity, salaries, and rank (Bellas, 1992; Ferber and Hoffman, 1997; Toutkoushian, 1998) and that men with at least one child benefit in terms of their employment status via reduced likelihood of holding a full-time non-tenure track position rather than a full-time tenure track position (Perna, 2001b). While the analyses in this study are limited by the adequacy of variables that are available in the NSOPF (as described above), the findings suggest important sex differences in the relationship between

work and family. As noted by others (e.g., Astin and Milem, 1997; Bellas, 1992), men with children and men with a spouse or partner who is not employed in higher education (and perhaps not employed in the labor force at all) benefit from having a spouse or partner who handles a greater share of household and childrearing responsibilities. The finding that women with children and women who are married do not realize similar benefits in terms of tenure or rank suggests that sex differences in the distribution of family responsibilities persist and that women's career outcomes are negatively impacted relative to men by these differences.

A third conclusion that may be drawn from this study is that having children does not reduce the likelihood of holding a tenured or full professor position among either women or men full-time faculty. While one interpretation of this finding is that higher education institutions and departments are supporting faculty in their efforts to manage work and family commitments, other findings from this research suggest that greater institutional and departmental support are required. For example, the analyses illustrate substantial gaps in the existence of family ties between women and men faculty who are working at four-year colleges and universities. Specifically, the descriptive analyses show that a substantially smaller share of women than men faculty have at least one child. Women are also more likely than men to have never married as well as be separated, divorced, or widowed. Individual campuses and departments should examine the extent to which existing policies, practices, and cultural norms support the ability of women and men faculty to assume and manage family ties.

Research suggests that institutions and departments can do more to assist women and men faculty with managing work and family demands by both adopting formal policies and encouraging use of these policies. Among the most important policies may be on-campus childcare, employment assistance for spouses and partners, and flexible schedules and leaves. An exploratory study of policies designed to assist dual-career couples suggests that colleges and universities generally recognize that such policies contribute to recruitment and retention goals (Wolf-Wendel et al., 2000). But, while the majority (85%) of the 360 institutions that responded to the survey indicated that they would "do something" to assist dual-career couples, only 24% of colleges and universities reported having formal policies (Wolf-Wendel et al., 2000). Similarly, a 1991 survey of 191 colleges and universities showed that, although most institutions had a policy regarding unpaid or paid leave for mothers at childbirth, fewer than one-half had policies covering job assistance for the spouse, accommodative scheduling, unpaid leave for fathers at childbirth, or on-campus childcare centers (Raabe, 1997). Institutional leaders should

consider the extent to which family-related policies contribute to recruitment and retention goals (Wolf-Wendel et al., 2000), as well as the barriers to usage of such policies (Raabe, 1997).

Institutional and departmental leaders should also not celebrate the finding that having children does not reduce the likelihood of holding a tenured or full professor position because, as stated in the limitations section, the analyses are restricted to women and men who were employed as full-time faculty in fall 1998. In other words, the analyses may mask the extent to which having children or being married restricts tenure and promotion if women and men with these responsibilities are more likely to leave the academy before attaining a tenured or full professor position or if women and men who want to be married and have children decide not to pursue faculty careers. Understanding the extent to which family ties contribute to a reduction in the pool of faculty who are eligible for tenure and promotion requires longitudinal data. Ideally, such a study would track the ways in which family ties influence the education and employment-related preferences, behaviors, and outcomes of women and men beginning in graduate school and continuing through promotion to full professor.

Finally, the analyses provide limited support for the notion that employment status of a spouse or partner provides faculty with the information and other resources that facilitate tenure and promotion. This study shows that, for men, having a spouse who is employed at the same higher education institution is associated with a lower probability of holding the lowest ranks of assistant professor and instructor, lecturer, or other rank rather than the highest rank of full professor. Because the data are cross-sectional, the extent to which this finding suggests that men benefit in terms of rank from social networks or that institutions find jobs for men's spouses during hiring, promotion, or retention processes is unclear. Contrary to expectations based on social network theory (Lin, 2001a, 2001b), the employment status of the spouse or partner is unrelated to tenure or promotion for women. Future research should explore the ways in which having a spouse employed at the same institution is related to tenure and promotion for men but not women. Such research should examine the extent to which the positive relationship depends on the academic rank of the spouse or partner relative to the individual's academic rank, the congruence of academic disciplines, and other characteristics of the spouse or partner.

Because of the absence of adequate proxies in the NSOPF:99 dataset, additional research is also required to understand the ways in which department, institutional, and national networks may shape the tenure and promotion processes of women and men faculty. The results of this

study suggest that the representation of women among tenured faculty in the field, a possible proxy for the opportunity for national networks, is unrelated to tenure and rank for both women and men faculty. While the extent to which the variable reflects research productivity rather than the opportunity for social networks is unclear, the results of this study suggest that research collaboration may provide women faculty with access to critical job-related resources or advantages. Women who report fewer than six recent collaborative publications are less likely than other women to hold the rank of assistant professor and other ranks than the rank of full professor (Table 3).

Future research should explore the ways in which social networks enable women and men faculty to gain information about the tenure and promotion process, the ways in which women and men may be excluded from critical collegial networks, and the ways in which particular social connections (e.g., academic spouse, graduate school advisor, senior mentor in the department) shape employment outcomes. Such research may suggest ways in which institutional leaders can reduce gender gaps not only in tenure and rank, but also in marital and parental status.

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ENDNOTES

1. Because of space limitations, coefficients and standard errors are not presented in the tables that summarize the results of the multinomial logit analyses. These data are available from the author on request.
2. As stated in the method section, this research relies on a more rigorous threshold of statistical significance ($p < .001$) than is used in most research in recognition of the design effects that are associated with the nested nature of the NSOPF:99 data. Lower levels of statistical significance are indicated on the tables (i.e., $p < .05$, $p < .01$) for those who are comfortable with a less stringent threshold.

REFERENCES

Aisenberg, N., and Harrington, M. (1988). *Women of Academe: Outsiders in the Sacred Grove*. Amherst, MA: University of Massachusetts Press.

Astin, H. S., and Milem, J. F. (1997). The status of academic couples in US institutions. In: Ferber, M. A., and Loeb, J. W. (eds.), *Academic Couples:Problems and Promises*. Chicago: University of Massachusetts Press, pp. 128–155.

Austin, A. E., and Pilat, M. (1990). Tension, stress, and the tapestry of faculty lives. *Academe* 77: 38–42.

Barbezat, D. A. (1988). Gender differences in the academic reward system. In: Breneman D. W., Youn T. I. K. (eds.), *Academic Labor Markets and Careers*, New York: The Falmer Press, pp. 138–164 (Chapter 7).

Becker, G. S. (1962). Investment in human capital:A theoretical analysis. *Journal of Political Economy* 70 (Suppl. 5): 9–49.

Becker, G. S. (1985). Human capital, effort, and the sexual division of labor. *Journal of Labor Economics* 3(1): S33–S58.

Becker, G. S. (1993). *Human Capital*, Chicago: University of Chicago Press.

Bellas, M. L. (1992). The effects of marital status and wives' employment on the salaries of faculty men: The (house) wife bonus. *Gender & Society* 6: 609–622.

Bellas, M.L. (1994). Comparable worth in academia: The effects on faculty salaries of the sex composition and labor-market conditions of academic disciplines. *American Sociological Review* 59: 807–821.

Bellas, M.L. (1997). Disciplinary differences in faculty salaries: Does gender bias play a role? *Journal of Higher Education* 68(3): 299–321.

Bellas, M. L., and Toutkoushian, R. K. (1999). Faculty time allocations and research productivity: Gender, race, and family effects. *Review of Higher Education* 22(4): 367–390.

Bradburn, E. M., and Sikora, A. C. (2002). *Gender and racial/ethnic differences in salary and other characteristics of postsecondary faculty: Fall 1998*. Washington, DC: US Department of Education, Office of Educational Research and Improvement (NCES 2002–170).

Broder, I. E. (1993). Professional achievements and gender differences among academic economists. *Economic Inquiry* 31: 116–127.

Clark, S. M., and Corcoran, M. (1986). Perspectives on the professional socialization of women faculty: A case of accumulative disadvantage? *Journal of Higher Education* 57: 20–43.

Creamer, E. G. (1998). *Assessing faculty publication productivity: Issues of equity, ASHE–ERIC Higher Education Report Volume 26, No. 2*. Washington, DC: The George Washington University: Graduate School of Education and Human Development.

Dey, E. L. (1994). Dimensions of faculty stress: A recent survey. *Review of Higher Education* 17: 305–322.

DeYoung, A. J. (1989). *Economics and American Education: A Historical and Critical Overview of the Impact of Economic Theories on Schooling in the United States*. White Plains, NY: Longman Inc.

Dreijmanis, J. (1991). Higher education and employment: Is professional employment a right? *Higher Education Review* 23(3): 7–18.

England, P., Farkas, G., Kilbourne, B. S., and Dou, T. (1988). Explaining occupational sex segregation and wages: Findings from a model with fixed effects. *American Sociological Review* 53: 544–558.

Fairweather, J.S. (1996). *Faculty Work and Public Trust:Restoring the Value of Teaching and Public Service in American Academic Life*. Boston: Allyn and Bacon.

Ferber, M. A., and Hoffman, E. P. (1997). Are academic partners at a disadvantage? In: Ferber, M. A., and Loeb, J. W. (eds.), *Academic Couples: Problems and Promises*. Chicago: University of Illinois Press.

Johnson, G. E., and Stafford, F. P. (1974). The earnings and promotion of women faculty. *American Economic Review* 64: 888–903.

Johnsrud, L. K., and Des Jarlais, C. D. (1994). Barriers to tenure for women and minorities. *Review of Higher Education* 17: 335–353.

Lin, N. (2001a). *Social Capital: A Theory of Social Structure and Action*. New York: Cambridge University Press.

Lin, N. (2001b). Building a network theory of social capital. In: Lin, N., Cook K., and Burt, R. S. (eds.), *Social Capital: Theory and Research*. New York: Aldine De Gruyter, pp. 3–29.

Marwell, G., Rosenfeld, R., and Spilerman, S. (1979). Geographic constraints on women's career in academia. *Science* 205: 1225–1231.

Milem, J. F., Sherlin, J., and Irwin, L. (2001). The importance of collegial networks to college and university faculty. In: Creamer, E. G. (ed.), *Working Equal: Academic Couples as Collaborators*. New York: Routledge Falmer, pp. 146–166.

National Center for Education Statistics (2003). *Digest of Education Statistics:2002 (NCES 2001-034)*. Washington, DC: US Department of Education, Office of Educational Research and Improvement.

Parsad, B., and Glover, D. (2002). *Tenure Status of Postsecondary Instructional Faculty and Staff: 1992–98*. Washington, DC: US Department of Education, Office of Educational Research and Improvement (NCES 2002–110).

Perna, L. W. (2001a). Sex and race differences in faculty rank and tenure. *Research in Higher Education* 42: 541–567.

Perna, L. W. (2001b). The relationship between family responsibilities and employment status among college and university faculty. *Journal of Higher Education* 72: 584–611.

Perna, L. W. (2001c). Sex differences in faculty salaries: A cohort analysis. *Review of Higher Education* 24(3): 283–307.

Polachek, S. W. (1977). Occupational segregation among women: Theory, evidence, and a prognosis. In: Lloyd, C. B., Andrews, E. S., and Gilroy, C. L. (eds.), *Women in the Labor Market*. New York: Columbia University Press.

Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology* 24: 1–24.

Raabe, P. H. (1997). Work-family policies for faculty: How "career- and family-friendly" is academe?. In: Ferber, M. A., and Loeb J. W. (eds.), *Academic Couples: Problems and Promises*, Urbana: University of Illinois Press, pp. 208–226.

Ransom, M.R., and Megdal, S.B. (1993). Sex differences in the academic labor market in the affirmative action era. *Economics of Education Review* 12(1): 21–43.

Rosenfeld, R. A., and Jones, J. A. (1987). Patterns and effects of geographic mobility for academic women and men. *Journal of Higher Education* 58: 493–515.

Smart, J. C. (1991). Gender equity in academic rank and salary. *Review of Higher Education* 14: 511–526.

Sorcinelli, M. D., and Near, J. P. (1989). Relations between work and life away from work among university faculty. *Journal of Higher Education* 60: 59–81.

Tack, M. W., and Patitu, C. L. (1992). *Faculty job satisfaction: Women and minorities in peril (ASHE-ERIC Higher Education Report No. 4)*. Washington, DC: The George Washington University, School of Education and Human Development.

Thomas, S. L., and Heck, R. H. (2001). Analysis of large-scale secondary data in higher education research: Potential perils associated with complex sampling designs. *Research in Higher Education* 42: 517–540.

Tierney, W. G., and Bensimon, E. M. (1996). Promotion and Tenure: Community and Socialization in Academe. Albany, NY: State University of New York Press.

Tolbert, P.S. (1986). Organizations and inequality: Sources of earnings differences between male and female faculty. *Sociology of Education* 59(4): 227–235.

Toutkoushian, R. K. (1998). Racial and marital status differences in faculty pay. *Journal of Higher Education* 69(5): 513–541.

Toutkoushian, R. K. (1999). The status of academic women in the 1990s: No longer outsiders, but not yet equals. *Quarterly Review of Economics and Finance* 39 (special issue): 679–698.

Weiler, W. C. (1990). Integrating rank differences into a model of male-female faculty salary discrimination. *Quarterly Review of Economics and Business* 30(1): 3–15.

Wolf-Wendel, L. E., Twombly, S., and Rice, S. (2000). Dual-career couples: Keeping them together. *Journal of Higher Education* 71: 291–321.

Youn, T. I. K. (1988). Studies of academic markets and careers: An historical review Chapter One. In: Breneman, D. W., and Youn, T. I. K. (eds.), *Academic Labor Markets and Careers*. New York: The Falmer Press, pp. 8–27.