Exploring Gender Disparities in Senior-Level Position Attainment in the Academic Workforce: Does Evidence Suggest a Glass Ceiling?

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Abstract: *This study investigates the role of gender in senior-level position attainment for teaching faculty and academic leaders in the academic workforce. Guided in part by the glass ceiling concept, employment models were specified to examine gender disparities in position attainment with regard to productivity-related variables. More specifically, the study investigates to what extent male and female employees differ on various indicators of career advancement. Results from the study highlight disparities by gender as well as its interaction with race/ethnicity regarding workplace experience and job satisfaction. Additionally, findings show that work-life balance issues (e.g., the presence of childcare benefits and leave policies) produced only minimal impact on the career prospects of either male or female employees.*

INTRODUCTION

Empirical research contends that women face disadvantages in the workplace, both in professional and academic settings (Glazer-Raymo, 2001, 2008; Jacobs, 1996; Mason & Goulden, 2002, 2004; Morrison & Von Glinow, 1990; Morrison, White, & Van Velsor, 1987). These

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disadvantages come in a variety of forms, including workplace discrimination and hostile climate, significant earning differentials for similar work, disproportionately slower promotion rates, and truncated professional experiences many refer to as the "glass ceiling." A growing body of research is beginning to explore the glass ceiling concept and gender-based differences in position attainment within educational settings and higher education in particular (Jackson & O'Callaghan, 2009, 2011; Johnsrud, 1991; Johnsrud & Heck, 1994; Lee, 2002).

Situated within a body of research on gender differences in professional outcomes and experiences in the higher education academic workforce, this article operationalizes the glass ceiling concept and provides research findings from an empirical study of gender disparities in position attainment. This study fits within an established line of inquiry on disparities in senior-level position attainment in higher education and extends previous findings by using an established framework that quantifies glass ceiling discrimination. Jackson and O'Callaghan (2011) explored senior-level employment disparities by race/ethnicity in the higher education academic workforce. Findings from that study supported the use of a glass ceiling framework (Cotter, Hermsen, Ovadia, & Vanneman, 2001; Maume, 2004) to further analyze differences for teaching faculty and academic leaders based on race/ethnicity and subsequently gender.

The current study extends this previous work by employing the glass ceiling framework to analyze gender differences in position attainment for the academic workforce. Accordingly, the following research question guided this study: Do gender differences exist for senior-level position attainment in the academic workforce[1], after controlling for productivity-relevant variables? Namely, what are the significant factors leading to position attainment for males and females, and how are they different? Moreover, this study considers whether any detected disparities indicate the presence of a glass ceiling.

[1] In the context of this study, the academic workforce includes both teaching faculty and academic leaders at American colleges and universities at four year institutions.

Literature Review

Originally, glass ceiling research only informed a portion of the research that has been conducted on gender discrimination in the workplace. In particular, the glass ceiling concept is often used to describe gender-based discrimination that increases with women's movement up the employment hierarchy, the effects of which include differences in salary, promotion potential, and position attainment. As a starting point for the present research, articles relating to glass ceilings and academic leaders in higher education were reviewed. This body of research contributed to the development of the conceptual framework which gives focus to this inquiry.

Numerous topics have been covered in the name of glass ceiling research. Different employment sectors have been analyzed, such as the United States Federal Government (Powell & Butterfield, 1994; Yamagata, Yeh, Stewman & Dodge, 1997), the United States military (Baldwin, 1996b; Cohen, Broschak, & Haveman, 1998), corporate America (Bartol, Martin, & Kromkowski, 2003; Bell, McLaughlin, & Sequeira, 2002; Morrison & Von Glinow, 1990; Morrison et al., 1987), and academia (Chliwniak, 1997; David & Woodward, 1997; Glazer-Raymo, 2001, 2008; Johnsrud, 1991). Likewise, different factors—those upon which glass ceilings produce effects—have also been researched. Salary (Cotter et al., 2001; Cotter, Hermsen, & Vanneman, 1999; Fisher, Motowidlo, & Werner, 1993; Ginther & Hayes, 1999; Johnsrud, 1991; Johnsrud & Heck, 1994; Kay & Hagan, 1995; Morgan, 1998; Yamagata et al., 1997), position attainment and promotion (Bain & Cummings, 2000; Ginther & Hayes, 1999; Johnsrud, 1991; Johnsrud & Heck, 1994; Shultz, Montoya, & Briere, 1992), and gender segregation (self-segregation and otherwise) of the workplace (Kay & Hagan, 1995; Lemons, 2003; Reskin, 1988; Yamagata et al., 1997) are among the factors that have been investigated.

It is also important to ascertain what has been learned about glass ceilings, the resulting effects on individuals and society, and how to determine whether they exist in employment settings. For example, women face persistent earning gaps over the course of their careers (Cotter et al., 2001; Fisher et al., 1993; Yamagata et al., 1997) and are promoted at slower rates and in fewer numbers than their male

colleagues (Baldwin, 1996a; Ginther & Hayes, 1999; Johnsrud & Heck, 1994; Maume, 2004; McDowell, Singell, Larry, & Ziliak, 1999). There is, however, little consensus on how best to operationalize and measure glass ceiling effects as well as a general lack of agreement as to the causes or origins of glass ceilings. Additionally, very few studies have been dedicated to identifying and quantifying the existence of glass ceilings in particular organizations or institutions.

Glass ceilings—as defined by invisible barriers that prevent the ascension of women and other marginalized groups to positions of leadership—exist, it seems, for numerous and not mutually exclusive reasons. Research has suggested numerous causes of glass ceilings, including the self-segregation of the workforce into traditionally male-dominated and female-dominated professions (England, Farkas, Kilbourne, & Dou, 1988); the gendered nature of work within professions, such as women in 'care-taking' roles and men in decision making or authoritarian roles (Mason & Goulden, 2002, 2004; Wright, Baxter, & Birkelund, 1995**)**; the dominance of a male figure in institutional organizations, that is pertaining to after-hours networking and extended travel (Wright et al., 1995); tension that exists for women in balancing work and family obligations (Mason & Goulden, 2002, 2004); overt gender discrimination in hiring and promotion processes (Johnsrud, 1991; Tomaskovic-Devey & Stainback, 2007); the influence of gender on the decision maker in said hiring and promotion processes (Glazer-Raymo, 2008; Johnsrud, 1991; Meier & Bohte, 2001), the lack of qualified women for positions of leadership, which conjures the leaky pipeline analogy (Frankforter, 1996; Morrison & Von Glinow, 1990); and lastly, gendered leadership styles that purportedly serve females poorly, especially those women in positions of power (Morrison & Von Glinow, 1990; Rosenfeld, 1980). This list, however, while it might accurately reflect the reasons that women repeatedly fail to achieve parity with males in the workforce, does not actually describe a glass ceiling or its effects with any specificity.

How a glass ceiling is measured remains a topic of great variability as well (Cotter et al., 2001; Jackson & O'Callaghan, 2009). In spite of a general understanding of the concept as a barrier to career success, measurement or assessment of that success appears open to interpretation. Scholars have relied on both qualitative and quantitative

research methods to assess glass ceilings and their impact on society. But these traditions indicate that the constructs used to measure glass ceilings and their effects have been obtained from a range of forms: salary data, position attainment data, and promotion data collected as part of rigorously conducted qualitative interviews (Glazer-Raymo, 2001).

When higher education research regarding position attainment and promotion (Bain & Cummings, 2000; Ginther & Hayes, 1999; Johnsrud, 1991; Johnsrud & Heck, 1994; Shultz et al., 1992) is juxtaposed with a vast and varied body of glass ceiling and gender discrimination research in academia, a connection between position attainment and glass ceilings begins to emerge. If a glass ceiling is generally viewed as a set of impediments and/or barriers to career success for women and people of color (Baxter & Wright, 2000; Morrison & Von Glinow, 1990; Morrison et al., 1987), lack of access or promotion to senior positions may be noted as barriers to career success. In fact, differential rates of position attainment (e.g., recruitment and promotion) fit squarely into a previous measurement of glass ceilings in previous research (Cotter et al., 2001; Maume, 2004).

To be certain, data regarding the representation of women in higher education are not very positive. The recent *American College President Report* issued by the American Council on Education (Cook & Kim, 2012), reveals only 26% of all college and university presidents are women. But gender-based, glass ceiling disparities still exist. Accordingly, this present study seeks to identify these gender-based differences in position attainment, ones that are not explicable by other productivity-relevant variables. In this manner, the present study connects the research on glass ceilings and gender discrimination, as it relates to position attainment in the context of higher education, by exploring the possible existence of glass ceilings in the academic workforce.

Guiding Framework

The conceptual framework that guides this study is informed primarily by research on glass ceilings. Variable selection stems from a larger body of research documenting gender differences in position attainment in higher education. The methods applied to these variables are an

outgrowth of work that seeks to identify glass ceilings in particular employment settings. With regard to variable selection, it should be noted that the concept of the glass ceiling in higher education has been explored using various methodologies (Glazer-Raymo, 2001). Some studies focus on the proportional representation of women in higher education and use demographic data to show their dismal representation in senior-level positions (Corrigan, 2002), while other studies focus on employment trends for women in colleges and universities (Johnsrud, 1991; Johnsrud & Heck, 1994). For example, differences between the positions that men and women hold, as well as discrepancies between their respective workplaces, demonstrate that women are not equal to men in terms of professional standing (e.g., levels of power, decision making, and authority) in educational institutions (Ards, Brintnall, & Woodard, 1997; Fisher et al., 1993; Johnsrud, 1991; Johnsrud & Heck, 1994). Gender differences in position attainment persist and possibly precipitate the glass ceiling effect for women in higher education. Yet these studies only provide an indication of where to look for gender differences, not how to measure for them or whether or not they approximate glass ceilings with any precision.

As noted by other scholars (Cotter et al., 2001; Maume, 2004), a glass ceiling occurs when discrimination increases in severity with movement up the occupational hierarchy. As a result, inequality grows over the course of an individual's career. Observation of racial and gender inequality is also apparent after controlling for productivity-relevant factors. Cotter et al. (2001) proposed a four-prong empirical test to measure for the existence of a glass ceiling. These include measuring for differences in career success that (a) are not explained by other job-relevant characteristics of the employee, (b) are greater at career end than in the beginning, (c) are proportionally different each successive stage of a career, and (d) grow greater over the course of a career. It is these four criteria, which direct and give structure to the current inquiry. In fact, Cotter et al.'s (2001) work has formed the basis of other studies (Maume, 2004) that seek to identify and understand glass ceiling effects. Accordingly, this study directly incorporates two of these criteria to discern glass ceiling effects for senior-level position attainment in the academic workforce, all for the sake of understanding employment disparities. First, a glass ceiling must represent a gender or racial difference that is not explained by other job-relevant characteristics of

the employee. This criterion is satisfied in the current study through the use of social capital, human capital, and ability variables, ones identified in relevant literature as contributing to gender differences in career advancement for members of the academic workforce. Second, a glass ceiling effect is greater at higher levels of an outcome rather than lower levels. The current study seeks to measure this by using data from six distinct employment groups, namely assistant, associate, and full professors as well as low-, mid-, and upper-level academic leaders.

Criteria 3 and 4 of Cotter et al.'s (2001) work require longitudinal data, and consequently, they are only casually referenced throughout this study. For example, the third requirement states that glass ceiling effects reside in chances of advancement into higher positions, not merely the proportion of individuals currently residing at those higher levels. Investigation into this type of discrimination requires the use of cohort data which is currently unavailable to higher education professionals on a national level. Alternatively, Cotter et al.'s (2001) fourth criterion for measuring glass ceiling effects states that these disparities represent advancement and opportunity differences for individuals, ones that increase over the course of their careers. Again, without the use of longitudinal data, this criterion remains unmeasured in this current study. Due to these limitations, glass ceilings are used only as guiding concepts for this study of gender disparities in the higher education workforce. While we cannot say for certain that any identified disparities are evidence of glass ceilings, they serve to highlight whether or not they might exist.

Method

In an attempt to understand differences in senior-level position attainment in the academic workforce based on gender, logistic regression analysis was utilized with data from a national survey of faculty in the United States. The dataset, variables, and analysis procedures are described in the next section.

Dataset

The National Study of Postsecondary Faculty (NSOPF), designed and conducted by the National Center for Educational Statistics (NCES), is

the most comprehensive dataset on the academic workforce and serves as the primary source of data for this research. This survey offers many advantages, including a design that permits the researcher to distinguish among the types of positions held by academic leaders, whereas other datasets tend to consolidate administrators into a single group. In each of the survey cycles, NSOPF gathers information regarding the backgrounds, responsibilities, workloads, salaries, benefits, attitudes, and future plans for both full- and part-time faculty (National Center for Educational Statistics [NCES], 2002). This current study utilizes data from the 1999 National Study of Postsecondary Faculty, or the NSOPF: 99 survey. While NSOPF: 04 data are available to researchers, they could not be used for these analyses because the principal activity variable used for the academic leader model in the NSOPF: 99 survey was eliminated and thus unavailable.

The data collection for NSOPF: 99 occurred during the academic year 1998–1999, surveying 960 degree-granting postsecondary institutions and retaining an initial sample of 31,354 faculty and instructional staff. Approximately 28,600 faculty and instructional staff were sent questionnaires. Subsequently, a sub-sample of 19,813 faculty and instructional staff were drawn for additional survey follow-ups. Approximately 18,000 faculty and instructional staff questionnaires were completed for a weighted response rate of 83%. The response rate for the institution survey was 93%. The weighted responses represent the national estimates for number of faculty in 1999 (957,767; NCES, 2002). In order to correct for the nonsimple, random sample design and to minimize the influence of large sample sizes on standard errors, the effective sample size was altered by adjusting the relative weight downward as a function of the overall design effect (Thomas, Heck, & Bauer, 2005). This end product was achieved by multiplying the relative weight by the reciprocal of the design effect (DEFF) value and then reweighting the data with the DEFF adjusted relative weight.

Dependent Variables

The dependent variables for both teaching faculty and academic leaders were based on individuals' responses to the modified primary activity question on the NSOPF: 99 survey. The question read, "What was your primary activity at this institution during the 1998 Fall term? If you have

equal responsibilities, please select one" (NCES, 2002). Responses were recoded to create three dummy variables for the academic workforce: (a) administration (i.e., academic leaders), (b) teaching, and (c) research. Faculty members in the administration category have assumed institutional positions committed to administrative functions (e.g., department chair, dean, and vice president of academic affairs). Faculty members categorized as "teaching" tended to represent the traditional tenured or tenure-track faculty profile (e.g., assistant, associate, and full professors), a mix of teaching, research, service, and outreach. Lastly, the research category (e.g., research professor and research scientist) included individuals who were mostly in non-tenure-track positions, focused on research.

The dependent variables for teaching faculty by rank were similarly based on individuals' responses to a question in regard to academic rank on NSOPF: 99. The question asked, "Which of the following best describes your academic rank, title, or position at this institution during the 1998 Fall term?" (NCES, 2002). Responses were likewise recoded to create three dummy variables for the teaching faculty: (a) full professor, (b) associate professor, and (c) assistant professor. These three options represent the professoriate trajectory through the tenure-track ranks. The full professor position represented the most senior-level rank, excluding special professorships (e.g., university, endowed, and named professors). The associate professor position typified the midcareer point for tenure-track faculty, having accumulated sufficient seniority and work production to be promoted from assistant professor, yet still requiring more seniority and work production to achieve full professorship. Lastly, the assistant professor position consisted of individuals who were generally not tenured, but rather individuals who usually seek tenure and promotion, thus representing the point of entry for faculty.

Lastly, the dependent variables for academic leaders by level were based on individuals' responses to another principal activity question on NSOPF: 99. The question asked: "What was your principal activity at this institution during the 1998 Fall term? If you have equal responsibilities, please select one" (NCES, 2002). Responses were similarly recoded to create three dummy variables for academic leaders: (a) lower-level, (b) mid-level, and (c) upper-level positions. Faculty members contained within these administration categories have assumed

institutional positions committed to administrative functions (e.g., department chair, dean, and vice president of academic affairs). The lower-level category consisted of entry level positions (e.g., assistant director), while the mid-level category included positions such as academic dean and department chair, and finally, the senior-level category included positions such as provost and president.

Independent Variables

In selecting independent variables, decisions were guided by research on gender-based discrimination in higher education, social capital theory, human capital theory, ability measures, and motivation. As glass ceiling criteria remains vague, a broad swath of published research was considered to select variables for the present model (Cotter et al., 2001; England et al., 1988; Glazer-Raymo, 2001, 2008; Jacobs, 1996; Morrison & Von Glinow, 1990; Morrison et al., 1987). The focus remained narrow, however, as this current study's main contention of glass ceiling criteria is that gender differences persist after controlling for other productivity-relevant characteristics of the employee (Cotter et al., 2001). The independent variables focused on the role of gender and emphasized the role of social capital variables (e.g., race/ethnicity) alongside human capital variables (e.g., experience and education), workplace productivity-relevant factors (e.g. publications, grants, and committee service), and job satisfaction. In addition, given the recent growth of research implicating work-life balance issues in the career success of women (Mason & Goulden, 2004), as well as the importance of institutional policies dealing with childcare and family leave, appropriate variables relevant to these factors (e.g., number of children, marital status, and the presence of institutional policy) were also included in the model. Lastly, given the growing body of research (Chatman, 1989) which emphasizes the importance of person-institution fit, the control variables for this study consisted of institutional variables as well (e.g., location, Carnegie classification, type, and control).

Accordingly, the logistic regression models included 18 independent variables. The human capital measures included: (a) age (used as a proxy for experience) and (b) degree level. The two social capital measures included gender: (a) female (male as referent group), and race: (b) American Indian (White as referent group), (c) Asian, (d) African

American, (e) Hispanic, and (f) Native Hawaiian/Pacific Islander. The work-life balance variables included: (a) number of dependents and (b) marital status (married as the referent group). The two institutional policy variables included: (a) the presence of a paid maternity/paternity leave policy and (b) the presence of a childcare benefit. The ability measures included: (a) career publications, (b) administrative committees, (c) teaching committees, (d) external funding, and (e) total number of grants. Finally, the motivation measure included overall job satisfaction.

Control Variables

Control variables for this study consisted of institutional variables. Institution location variables included: (a) New England region (Midwest as referent group), (b) Mideast region, (c) Plains region, (d) Southeast region, (e) Southwest region, (f) Rocky Mountain region, and (g) Far-west region. Carnegie classification variables included: (a) comprehensive institutions (research institutions as referent group), (b) doctoral institutions, and (c) liberal arts institutions. Institutional control variables included public institutions (private institutions as referent group).

Data Analysis

In an attempt to understand differences in senior-level position attainment in the academic workforce based on gender, logistic regression analysis was applied. In particular, the analysis was used to assess the effects of individual- and institutional-level characteristics on the probability of an individual faculty member obtaining a senior-level position by gender (Cabrera, 1994). Several measures of fit were used when judging the significance of each logistic regression model: X^2 of the model, Pseudo R^2, and PCPs. These fit indices determine how well a priori model fits the sample data. A significant X^2 indicates that the independent variable as a group correlates with the dependent variable. At most, the Pseudo R^2 represents the proportion of error variance in relation to a null model. PCPs represent the percent of cases predicted by the model. PCPs higher than 55% signify a good fit for the model (Cabrera, 1994). As a measure of the magnitude of effect, delta-p was used, a representation of the change in dependent variable probability

due to a change in the factor variable under consideration. For example, a delta-p value of 0.045 indicates that a one-unit change in the predictor is related to a 4.5 percentage point increase in the likelihood that a faculty member would become an academic leader.

Limitations of Study

There are several limitations of this study worth noting. First, its analyses were limited to variables contained in NSOPF: 99. The NSOPF: 99 survey is the most comprehensive survey of the academic workforce and a rich data source; its measures, however, were somewhat limited. While the 28 variables used for these analyses were applicable, other forms of social capital, human capital, ability, work-life balance, motivation, and institutional policy variables were unavailable. Second, analyses for this study were limited to cross-sectional data. Therefore, these results include members of the academic workforce employed during the year of data collection. In turn, implications of this study are derived from a relatively narrow duration of time and do not consider the use of the third and fourth glass ceiling measurement criteria, as indicated in Cotter et al.'s (2001) "The Glass Ceiling Effect." Lastly, the only data suitable for the present study is from NSOPF: 99. While these limitations are apparent in the present study, the results still provide a window for understanding the differential outcomes by gender in the academic workforce.

Findings

Descriptive Results

Table 1 presents the descriptive data for the observed representation of primary activity for faculty by gender. For all positions, males constituted the highest percentage regarding the observed representation in all positions. Therefore, the remainder of this section will focus on the percentage distribution by rank for females. Regarding teaching faculty, 40.3% were females. As for academic leaders, 35.3% were females. Women constituted 43.2% of the observed representation for assistant professors, 32.5% for associate professors, and 18.8% for full professors. With regard to lower-level positions, females held 44% of these positions. Mid-level positions were slightly different, with females

constituting 35.9%, and lastly, 19.5% of upper-level positions were held by women. For the most part, these data show a decrease in representation for females as they move through the ranks toward senior-level positions in the academic workforce.

Table 1
Observed Representation of the Primary Activity for Faculty by Gender at Four-Year Institutions: Fall 1998

	Gender	
	Males	Females
Position		
Faculty	59.7%	40.3%
Academic Leaders	64.7%	35.3%
Assistant Professor	56.8%	43.2%
Associate Professor	67.5%	32.5%
Full Professor	81.2%	18.8%
Lower-Level	56.0%	44.0%
Mid-Level	64.1%	35.9%
Upper-Level	80.5%	19.5%

Note. Observed representation was based on the adjusted weighted sample

Logistic Regression Results

This article examines access to senior-level positions with regard to gender, both for teaching faculty and academic leaders in the academic workforce. The following results address the first and second criteria for the existence of a glass ceiling provided by Cotter et al. (2001). The third and fourth criteria could not be addressed because longitudinal data were not available for this study. Table 2 shows the results of four separate logistic regression models. Four separate models were specified for traditional employment categories in the academic workforce: teaching

faculty and administration (i.e., academic leaders) for both males and females. Each model reports the delta-p values for statistically significant variables. Therefore, only significant variables are discussed in this section. The columns display the statistically significant delta-p values, which illustrate the change in the default probability[2] that each significant variable makes controlling for all others. Based on the goodness-of-fit indices, the academic leader model is an excellent fit and the teaching faculty model is a good fit.

In the teaching faculty model for males, the delta-p values indicate that there were eleven variables that generated significant effects in the probability of the observed representation in positions with the principle function of teaching. As for human capital variables, a higher degree level (0.0343***) increased the default probability. With regard to work-life balance variables, full-time positions (0.1574***) displayed increased the default probability. Concerning ability variables, more teaching committees served (0.0167***) and more external funding (0.0000*) yielded increased the default probability. In contrast, more career publications (-0.0006**), more administrative committees served (-0.0077*), and the higher the total number of grants (-0.0192***) all decreased the default probability. Considering the motivation variable, higher levels of job satisfaction (-0.0425***) decreased the default probability. Employment in the following institutional types: doctoral (-0.1999**), comprehensive (-0.3638***), and liberal arts (-0.3553***) institutions—as compared to research institutions—decreased the default probability. None of the social capital, institutional policies, region, and institutional control variables were significant.

[2] In the context of this study, the default probability is the position of interest for each model represented by the respective dependent variables. Specifically, teaching faculty, academic leader, assistant professor, associate professor, full professor, lower-level, mid-level, and upper-level positions.

Table 2
Logistic Regression Results for Teaching Faculty and Academic Leadership at 4-Year Institutions by Gender

Variable	Teaching Faculty		Academic Leadership	
Gender	Male	Female	Male	Female
Individual Level Characteristics				
Human Capital Variables				
Age$_1$			0.0024***	0.0017*
Degree Level	0.0343***	0.0587***	-0.0107*	-0.0201***
Social Capital Variables				
American Indian (White)				
Asian				0.2074*
African American				
Hispanic				
Native Hawaiian/Pacific Islander				
Work-Life Balance	.			
Employed Full-time (Part-time)	0.1574***	0.1832***	-0.0609***	-0.0687***
Number of Dependents				
Single (Married)				
Institutional Policies				
Paid Maternity Leave				
Childcare Benefit				
Ability Variables				
Career Publications	-0.0006**	-0.0006*		
Administrative Committees Served	-0.0077*	-0.0131**	0.0173***	0.0173***
Teaching Committees Served	0.0167***	0.0170***		
External Funding	0.0000*	0.0000*		
Total Number of Grants	-0.0192***	-0.0175***	-0.0034**	
Motivation Variables				
Overall Job Satisfaction	-0.0425***		0.0282***	
Institutional Level Control Variables				
Region				
New England Region (Mid West)				
Mid East Region				
Plains Region				
South East Region				
South West Region				
Rocky Mountain Region				
Far West Region				
Carnegie Classification				
Comprehensive Institutions (Research)	-0.3638***	-0.2955***		
Doctoral Institutions	-0.1999**	-0.1834***		
Liberal Arts Institutions	-0.3553***	-0.3714***		

Table 2 (Cont.)
Logistic Regression Results for Teaching Faculty and Academic Leadership at 4-Year Institutions by Gender

Variable	Teaching Faculty		Academic Leadership	
Gender	Male	Female	Male	Female
Model X^2, df	636.238, 28	349.434, 28	246.369, 28	182.179, 28
Pseudo R^2	0.282	0.263	0.174	0.219
PCP	0.74	0.77	0.896	0.912

Note: Delta-p statistics are shown only for those variables whose coefficients were significant: *p< .05, **p<.01, ***p<.001
[1] Age is used in this model as a proxy for experience in the workforce/workplace.

In the teaching faculty model for females, the delta-p values indicate that there were ten variables that produced significant effects in the probability of the observed representation in positions with the principle function of teaching. In regard to human capital variables, a higher degree level increased (0.0587***) the default probability. Concerning work-life balance variables, full-time positions (0.1832***) increased the default probability. Regarding ability variables, more teaching committees served (0.0170***) and more external funding yielded (0.0000*) increased the default probability. Alternatively, more career publications (-0.0006*), more administrative committees served (-0.0131**), and the higher the total number of grants (-0.0175***) all decreased the default probability. As proved to be the case in the teaching faculty model for males, employment in the following institutional types: doctoral (-0.1834***), comprehensive (-0.2955***), and liberal arts institutions (-0.3714***)—as opposed to research institutions—decreased the default probability. None of the social capital, institutional policies, motivation, region, and institutional control variables were significant.

The delta-p values for the academic leader model for males indicate that there were six variables that generated significant effects in the probability of the observed representation in positions with the principally administrative functions. Regarding human capital variables, increases in age (0.0024***) increased the default probability. In contrast, a higher degree level decreased the default probability (-0.0107*). With regard to work-life balance variables, being full-time decreased the default probability (-0.0609***). Concerning ability variables, serving on administrative committees increased the default

probability (0.0173***), while a higher number of grants decreased the default probability (-0.0034**). Per the motivation variable, overall job satisfaction significantly increased the default probability (0.0282***). None of the social capital, institutional policies, region, Carnegie classification, and institutional control variables were significant.

The delta-p values for the academic leader model for females indicate that there were five variables that produced significant effects in the probability of the observed representation in positions with the principle function of administration. As for human capital variables, increases in age (0.0017*) in turn increased the default probability. On the contrary, a higher degree level decreased the default probability (-0.0201***). In relation to social capital variables, being Asian increased the default probability (0.2074*). With regard to work-life balance variables, being full-time decreased the default probability (-0.0687***). Regarding ability variables, serving on administrative committees increased the default probability (0.0173***). None of the institutional policies, motivation, region, Carnegie classification and institutional control variables proved significant.

Table 3 shows the results of six separate logistic regression models for teaching faculty by rank and gender. Six separate models were specified for traditional employment ranks for tenure-track faculty: (a) assistant professor, (b) associate professor, and (c**)** full professor for both males and females. Each model reports the delta-p values for statistically significant variables. The columns display the statistically significant delta-p values, which show the change in the default probability that each significant variable makes controlling for all others. Again, using the goodness-of-fit indices, these six models proved to be a good fit.

In the assistant professor model for males, the delta-p values indicate that there were four variables that generated significant effects in the probability of the observed representation in assistant professor positions. Considering human capital variables, as age increased, the default probability decreased (-0.010***), and higher degree levels increased the default probability (0.0362***). With regard to work-life balance variables, being full-time decreased the default probability (-0.1097***). As for ability variables, more career publications decreased the default probability (-0.0023***). None of the social

Table 3
Logistic Regression Results for Teaching Faculty by Rank at 4-Year Institutions by Gender

Variable	Assistant Professor		Associate Professor		Full Professor	
Gender	Male	Female	Male	Female	Male	Female
Individual Level Characteristics						
Human Capital Variables						
Age[1]	-0.010***	-0.0067***	0.0014*	0.0042***	0.0177***	0.0144***
Degree Level	0.0362***	0.0780***	0.0324***	0.0630***	0.1098***	0.0935***
Social Capital Variables						
American Indian (White)						
Asian						
African American		-0.0598*				
Hispanic						
Native Hawaiian/Pacific Islander						
Work-Life Balance						
Employed Full-time (Part-time)	-0.1097***	-0.1139***	-0.0897***	-0.1178***	-0.1532***	-0.1314***
Number of Dependents			0.0188***			
Single (Married)						
Institutional Policies						
Paid Maternity Leave						
Childcare Benefit						
Ability Variables						
Career Publications	-0.0023***	-0.0012***	-0.0008***		0.0019***	0.0034***
Administrative Committees Served			0.0072**		0.0074*	
Teaching Committees Served					0.0047*	
External Funding						
Total Number of Grants						
Motivation Variables						
Overall Job Satisfaction			0.0260***		0.0370**	0.0429*
Institutional Level Control Variables						
Region						
New England Region (Mid West)						
Mid East Region						
Plains Region						
South East Region						
South West Region						
Rocky Mountain Region						
Far West Region						
Carnegie Classification						
Comprehensive Institutions (Research)			0.0355*			
Doctoral Institutions						
Liberal Arts Institutions						
Institutional Control						
Public (Private)						
Adjusted Weighted Sample	6845	4990	6845	4990	6845	4990
Estimate Population Size	604,351	371,416	604,351	371,416	604,351	371,416
P_o	0.1524	0.1524	0.1519	0.1519	0.2028	0.2028
Model X^2, df	492.962, 28	301.751, 28	204.761, 28	265.835, 28	1178.456, 28	386.732, 28
Pseudo R^2	0.268	0.247	0.109	0.239	0.479	0.382
PCP	0.844	0.82	0.788	0.832	0.809	0.896

Note: Delta-p statistics are shown only for those variables whose coefficients were significant: *p< .05, **p<.01, ***p<.001
[1] Age is used in this model as a proxy for experience in the workforce/workplace.

capital, institutional policies, motivation, region, Carnegie classification, and institutional control variables were significant.

In the assistant professor model for females, the delta-p values demonstrate that there were five variables that produced significant effects in the probability of the observed representation in assistant professor positions. In regard to human capital variables, as age increased, the default probability decreased (-0.0067***). By contrast, higher degree levels increased the default probability (0.0780***). In relation to social capital variables, being African American decreased the default probability (-0.0598*). Concerning work-life balance variables, being full-time decreased the default probability (-0.1139***). Per ability variables, more career publications decreased the default probability (-0.0012***). None of the institutional policies, motivation, region, Carnegie classification, and institutional control variables proved significant.

In the associate professor model for males, the delta-p values indicate that there were eight variables that generated significant effects in the probability of the observed representation in associate professor positions. With regard to human capital, increases in age increased the default probability (0.0014*), as did higher degree levels (0.0324***). Concerning work-life balance variables, being full-time decreased the default probability (-0.0897***), and more dependents increased the default probability (0.0188***). As for ability variables, more career publications decreased the default probability (-0.0008***) while more administrative committees served (0.0072**) increased the default probability. The motivation variable (i.e., overall job satisfaction) significantly increased the default probability (0.0260***). Lastly, employment in comprehensive institutions, as compared to research institutions (0.0355*), increased the default probability. None of the social capital, institutional policies, region, and institutional control variables were significant.

In the associate professor model for females, the delta-p values demonstrate that there were three variables that produced significant effects in the probability of the observed representation in associate professor positions. In relation to human capital variables, as age increased, the default probability increased (0.0042***). Higher degree

levels also increased the default probability (0.0630***). With regard to work-life balance variables, being full-time decreased the default probability (-0.1178***). None of the social capital, work-life balance, institutional policies, ability, motivation, region, and institutional control variables proved significant.

In the full professor model for males, the delta-p values indicate that there were seven variables that generated significant effects in the probability of the observed representation in full professor positions. In relation to human capital variables, as age increased, so too did the default probability (0.0177***). The default probability also increased with higher degree levels (0.1098***). Considering work-life balance variables, being full-time decreased the default probability (-0.1532***). As for ability variables, more career publications (0.0019***), more teaching committees served (0.0047*), and more administrative committees served (0.0074*) all increased the default probability. The motivation variable (e.g., overall job satisfaction) significantly increased the default probability (0.0370**). None of the social capital, institutional policies, region, Carnegie classification, and institutional control variables were significant.

In the full professor model for females, the delta-p values indicate that there were five variables that generated significant effects in the probability of the observed representation in full professor positions. In relation to human capital variables, as age increased, the default probability increased as well (0.0144***). A higher degree level also increased the default probability (0.0935***). Considering work-life balance variables, being full-time decreased the default probability (-0.1314***). As for ability variables, more career publications increased the default probability (0.0034***). The motivation variable (e.g., overall job satisfaction) significantly increased the default probability (0.0429*). None of the social capital, institutional policies, region, Carnegie classification, and institutional control variables proved significant.

Table 4 shows the results of six separate logistic regression models for academic leaders by rank and gender. Six separate models were specified for traditional employment ranks for faculty assuming administrative positions: (a) lower-level, (b) mid-level, and (c) upper-level for both

Table 4
Logistic Regression Results for Academic Leaders by Level at 4-Year Institutions by Gender

Variable	Lower-Level		Mid-Level		Upper-Level	
Gender	Male	Female	Male	Female	Male	Female
Individual Level Characteristics						
Human Capital Variables						
Age[1]			0.0027***			
Degree Level	-0.0109***	-0.0243***				
Social Capital Variables						
American Indian (White)						
Asian						
African American						
Hispanic					-0.0057*	
Native Hawaiian/Pacific Islander						
Work-Life Balance						
Employed Full-time (Part-time)	-0.0281***	-0.0335***	-0.0458***	-0.0532***		
Number of Dependents						
Single (Married)						
Institutional Policies						
Paid Maternity Leave						
Childcare Benefit						
Ability Variables						
Career Publications					0.0000*	
Administrative Committees Served			0.0131***	0.0141***	0.0021***	
Teaching Committees Served	-0.0065*					
External Funding					0.000*	
Total Number of Grants					-0.0009*	
Motivation Variables						
Overall Job Satisfaction			0.0154*		0.0074*	
Institutional Level Control Variables						
Region						
New England Region (Mid West)						
Mid East Region						
Plains Region						
South East Region	-0.0259*					
South West Region	-0.0304**					
Rocky Mountain Region						
Far West Region						
Carnegie Classification						
Comprehensive Institutions (Research)	0.0577**		0.0018*			
Doctoral Institutions						
Liberal Arts Institutions						
Institutional Control						
Public (Private)		-0.0333*			0.0140*	
Adjusted Weighted Sample	6845	4990	6845	4990	6845	4990
Estimate Population Size	604,351	371,416	604,351	371,416	604,351	371,416
P_o	0.0417	0.0417	0.0653	0.0653	0.007	0.007
Model X^2, df	109.764, 28	114.105, 28	191.488, 28	153.252, 28	108.628, 28	19.975, 28
Pseudo R^2	0.139	0.197	0.153	0.206	0.317	0.3
PCP	0.962	0.951	0.916	0.927	0.99	0.995

Note: Delta-p statistics are shown only for those variables whose coefficients were significant: *p< .05, **p<.01, ***p<.001
[1] Age is used in this model as a proxy for experience in the workforce/workplace.

males and females. Each model reports the delta-p values for statistically significant variables. The columns display the statistically significant delta-p values, which show the change in the default probability that each significant variable makes controlling for all others. Based on the goodness-of-fit indices, these six models were an excellent fit.

In the lower-level model for males, the delta-p values indicate that there were six variables that generated significant effects in the probability of the observed representation in lower-level positions. In relation to human capital variables, as degree level increased, the default probability decreased (-0.0109***). Considering work-life balance variables, being full-time decreased the default probability (-0.0281***). As for ability variables, more teaching committees served decreased the default probability (-0.0065*). With regard to regional variables, being located in both Southeast (-0.0259*) and Southwest (-0.0304**) regions (compared to Midwest regions) decreased the default probability. Lastly, employment in the comprehensive institutions, as compared to research institutions, increased the default probability (0.0577**). None of the social capital, institutional policies, motivation, and institutional control variables proved significant.

In the lower-level model for females, the delta-p values show that there were three variables that produced significant effects in the probability of the observed representation in lower-level positions. In regard to human capital variables, the default probability decreased as degree level increased (-0.0243***). Per work-life balance variables, being full-time decreased the default probability (-0.0335***). As for institutional control variables, being at a public institution—as compared to a private institution—decreased the default probability (-0.0333*). None of the social capital, institutional policies, ability, motivation, region, Carnegie classification, and institutional control variables were significant.

In the mid-level model for males, the delta-p values indicate that there were five variables that generated significant effects in the probability of the observed representation in mid-level positions. Concerning human capital variables, as age increased, the default probability increased (0.0027***). Considering work-life balance variables, being full-time decreased the default probability (-0.0458***). With regard to ability variables, more administrative committees served increased the default

probability (0.0131***). Per the motivation variable, overall job satisfaction significantly increased the default probability (0.0154*). Lastly, employment in the comprehensive institutions, as compared to research institutions, increased the default probability (0.0018*). None of the social capital, institutional policies, region, and Carnegie classification, and institutional control variables were significant.

In the mid-level model for females, the delta-p values show that there were two variables that produced significant effects in the probability of the observed representation in mid-level positions. In relation to work-life variables, being full-time decreased the default probability (-0.0532***). In regard to ability variables, more administrative committees served increased the default probability (0.0141***). None of the human capital, social capital, institutional policies, motivation, region, Carnegie classification, and institutional control variables were significant.

In the upper-level model for males, the delta-p values indicate that there were seven variables that generated significant effects in the probability of the observed representation in upper-level positions. Considering social capital variables, being Hispanic decreased the default probability (-0.0057*). As for ability variables, more career publications (0.0000*), more administrative committees served (0.0021***), and more external funding (0.000*) all increased the default probability. Interestingly though, a higher total number of grants resulted in decreased default probability (-0.0009*). Per the motivation variable, overall job satisfaction significantly increased the default probability (0.0074*). Lastly, employment in public institutions—as compared to private institutions—increased the default probability (0.0140*). None of the human capital, work-life balance, institutional policies, region, and Carnegie classification variables were significant. In the upper-level model for females, the delta-p values indicate that there were no variables that produced significant effects in the probability of the observed representation in upper-level positions.

Discussion

The results from this study show some differences, although minimal, between male and females in the academic workforce. Statistically

significant results emerged for each of the models, yet the overall the magnitude of these variables was small. Nonetheless, at least six conclusions based on Cotter et al.'s (2001) two applicable glass ceiling criteria may be drawn from this study and applied to our research question. To reiterate, these two criteria include differences in career success that a) are not explained by other job-relevant characteristics of the employee and b) are greater at career end than in the beginning.

First, with regard to the human capital variables, it is unclear as to why having a higher degree level showed a negative relationship for both males and females with the academic leadership and lower-level models. These results first came to our attention while performing the original analyses, which included both two- and four-year institutions. In an effort to address this unexpected occurrence, the authors restricted the analyses to four-year institutions, and the same results still emerged. Our only speculation in this regard is that individuals with higher levels of education (e.g., J.D.), but not doctorate degrees, are securing these positions and potentially skewing the results.

Second, examining age as a proxy for experience seems to be a good predictor for academic leadership positions as well as movement through teaching faculty ranks for both males and females. Our results seem to support the conventional thought that there is no substitution for work experience with regard to moving through the ranks in the academic workforce. Likewise, the number of an individual's career publications provides a good indication of the career stage of teaching faculty. This conclusion also makes intuitive sense; generally, the number of publications achieved by an individual is a crude, but nonetheless accepted, approximation of scholarly ability and career success.

Third, while race/ethnicity was not the focus of this study, there are several occasions when race/ethnicity variables were significant. Namely, being Asian was a positive significant factor for females in academic leadership positions. In contrast, being African American was a significant negative factor for females in assistant professor positions. Likewise, being Hispanic was a significant negative factor for males in upper-level positions. Therefore, the intersection of race and gender yielded mixed results. That is, our models showed both positive and negative outcomes when race/ethnicity and gender intersect.

Fourth, overall job satisfaction changes at various stages within the academic workforce. Males express higher levels of overall job satisfaction than females. For example, males in academic leadership, mid-level, upper-level, associate, and full professor positions showed significant positive job satisfaction. It must also be noted that a significant negative effect was found for male teaching faculty. Both males and females were more likely to be satisfied with their work when they were in senior-level positions (i.e., full professor). This finding is an important one, as it highlights the fact that once individuals achieve career success as defined by position attainment, they are generally satisfied with their work.

Fifth, the work-life balance variables in these models did not prove to be significant for either males or females. Neither marital status nor the presence of dependents were significant determining factors in regard to senior-level position attainment. Likewise, the presence of institutional policies regarding family leave and childcare were not driving factors. Interestingly, males with higher numbers of children were more likely to be associate professors. Therefore, it appears that the presence of more children does not impede the progress of males toward tenure. Lastly, of particular note, when considering the full group of professionals in both the teaching faculty and academic leadership models, the results were surprisingly uniform for both genders, with four exceptions out of 32 significant coefficients. When considering position level, however, differences by gender started to emerge. The factors in the models were better predictors of presence for males in the academic workplace, with very few significant mid-level coefficients and none in the upper-level for females.

In applying the findings from this study to Cotter et al.'s (2001) glass ceiling framework, the following observations were made. Concerning the first criterion, do the results of the study demonstrate gender differences in position attainment that are not attributable to characteristics of the individual? The results of the study demonstrate, with regard to gender, that there are few, if any, differences in the significant variables for position attainment between males and females. Males and females did not differ, to a large degree, in those items that increased or decreased the probability of holding a senior-level position.

Regarding the second criterion, the existence of glass ceilings is implied when examining significant gender differences, such that women are especially disadvantaged in the upper tail of the outcome distribution(s). With respect to the findings of this study, this conclusion does not seem to be the case. There were no instances where female teaching faculty and academic leaders experienced a significant, much less negative effect on the chances of achieving a position that differed from males. In summary, these results are unable to conclusively demonstrate the existence or absence of glass ceilings with any degree of certainty. The results of this study, however, hint that glass ceilings may not be as impermeable in the academic workforce as once thought. These inconclusive, and at times counterintuitive, results certainly help to build a case for demanding a full-scale investigation into higher education glass ceilings.

Implications for Future Research

With regard to position attainment, the study presents multiple opportunities for future research. First, the interactive effects of race/ethnicity and gender, as well as previously identified racial differences in position attainment (Jackson & O'Callaghan, 2011), indicate that further research at the point of multiple, intersecting identities (Crenshaw, 1991; McCall, 2005) is warranted. Second, job satisfaction as an indicator of career motivation—and ultimately, career success—remains an intriguing line of research. An area of particular interest to explore is whether or not an individual's degree of job satisfaction changes over the course of an individual's career. Further inquiry into those career stages where satisfaction registers as negative, neutral, or positive would be useful in determining how best to support individuals throughout said careers. This line of inquiry could add to existing research regarding the role of professional development activities (Luna & Cullen, 1995; Ferreira, 2003; Leveson (1990); Rosser, 1990) in continued career satisfaction.

Third, there is great potential for future research efforts on glass ceilings and gender inequities in position attainment. As demonstrated by this study, the existence or absence of glass ceilings in higher education for female teaching faculty and academic leaders was unable to be confirmed. Yet a more thorough investigation into the glass ceiling

phenomenon would be possible with access to longitudinal employment data. For the knowledge base to expand beyond its current scope, these data sets are required (Cotter et al., 2001). Lastly, this study only examined significant differences between male and females when models for each gender were run separately. As a result, the data reveal that men and women as groups of employees do not differ from each other to a significant degree in the factors that contribute to career success. The structure of analysis was purposeful, so as to be concerned with the role of each of the variables in individual experiences, and not which variables made a difference in the entire academic workforce.

In closing, our research provides a rubric for the degree to which gender inequities may or may not be present in the academic workforce. It is imperative that institutions take further action to remediate inequality if this research confirms widespread gender-based discrimination in the recruitment, hiring, retention, and promotion processes in regard to female teaching faculty and academic leaders. To this end, further research related to effectually eliminating these barriers will be required. There is certainly a modest amount of research that reveals the steps that individuals take to remove these barriers to career success in their own personal lives (e.g., Chliwniak, 1997; Eagly & Johnson, 1990), but there also exists a complementary and growing body of research that details programs and initiatives that institutions, professional associations, and doctoral preparation programs can undertake to ensure that their hiring and admission processes are fair and that their promotion and retention efforts are equitable. The findings from the current research support expansion into this area of research, primarily due to the result that as groups males and females do not significantly differ on variables such as human capital, social capital, work-life balance, institutional policy, ability, motivation, or institution type and location that traditionally influence position attainment. Therefore, more research into external variables that affect career achievement for women is warranted.

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