ABSTRACT

Title of Dissertation:	THE ARCHETYPE OF A CHIEF ACADEMIC OFFICER: KEY FORMS OF CAPITAL AMONG THE CAOS OF THE AAU
	Courtney Lennartz
Dissertation Directed By:	Dr. KerryAnn O'Meara, Department of Counseling, Higher Education, and Special Education

An overwhelming majority of the chief academic officers at our nation's top research universities are white men. In a time where institutions are actively trying to recruit diverse talent, enhance student outcomes, and generate revenue, this lack of diversity in academic leadership is preventing them from achieving these goals and making significant positive gains for both students and the institution. Using data on the AAU CAOs from 2008 to June 2020, this dissertation identifies key forms of capital that have enabled these individuals to advance to the role of CAO at an AAU institution. Using descriptive statistics and quantitative methods, this dissertation also examines gender differences in key forms of human capital, cultural capital, and social capital among the AAU CAOs, and reveals the dominant archetype of an AAU CAO. The findings of this study have significant implications for institutions seeking to improve the representation and full participation of women in this leadership position. It also has the potential to enable aspiring women leaders to make strategic career decisions in order to become CAO of an AAU institution.

THE ARCHETYPE OF A CHIEF ACADEMIC OFFICER:
KEY FORMS OF CAPITAL AMONG THE CAOS OF THE AAU

by

Courtney Lennartz

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2020

Committee Members:
Dr. KerryAnn O'Meara, Chair
Dr. Kimberly Griffin
Dr. Sharon Fries-Britt
Dr. Jennifer Rice
Dr. Tracy Sweet

Dedication

This dissertation is dedicated to my soon to be husband, Sam. For encouraging me every step of

the way and for providing the support I needed to finish this journey.

Acknowledgments

There are so many people that made an impact on me throughout my PhD journey. I want to begin by thanking my mentors from Vanderbilt who encouraged me to pursue my PhD and supported my decision to do so at the University of Maryland- Dr. John Braxton, Dr. Brent Evans, and Dr. Christopher Marsicano. Throughout my time at UMD you have kept in touch and even collaborated with me on different research projects. Thank you for believing in me.

I would also like to thank Dan Bauman for sharing the dataset he and Audrey Williams June created for their study of the AAU CAOs. Dan's generosity saved precious time and provided a dataset that I could build upon to examine my research questions. My dissertation committee- Dr. Kimberly Griffin, Dr. Sharon Fries-Britt, Dr. Tracy Sweet, Dr. Jennifer Rice, and Dr. Julie Park- kindly leant me their time and provided thoughtful feedback on the conceptualization of my study and dissertation overall. In doing so they enabled me to complete my dissertation and the requirements for my degree. I cannot say thank you enough.

The doctoral journey was difficult and at times I struggled to see the light at the end of the tunnel. It challenged me in so many ways. I am thankful for the support I received from my friends and peers in the doctoral program- Lindsey Templeton and Dawn Culpepper. You both shared your struggles and triumphs openly with me which helped put things in perspective and motivated me to keep going. The encouragement and support my family (including my dog Meah) and friends (especially Dr. Lauren Halberstadt) provided along the way was also incredibly impactful and much needed.

I owe a huge thank you to my chair, advisor, and mentor, Dr. KerryAnn O'Meara. Thank you for taking me on as your doctoral student five years ago. The opportunities you have afforded me throughout my doctoral journey have enabled me to get to where I am today. Your

support, guidance, and feedback provided throughout the dissertation process has enabled me to produce a piece of work I am proud of. I could not ask for a better chair, advisor, and mentor.

Last but not least, Sam. Your love, support, and encouragement along this journey has been unending. Despite me spending so many of our weekends writing, you never once complained and did everything you could to make life easier for me. I could not have done it without you. For that, I am forever grateful and dedicate this dissertation to you.

Table of Contents

List of Tables

List of Figures

Chapter One

While the typical profile of the university president is slowly changing, only 30% of women hold the top job (ACE, 2017). The most common steppingstone to the presidency is the office of the provost. However, there is an even greater gender disparity among chief academic officers (CAOs) in higher education, most notably at elite research universities. Over 75% of the CAOs at the American Association of Universities (AAU) institutions are men (June & Bauman, 2019). In a time where universities are actively trying to recruit diverse talent, enhance student outcomes, and generate more revenue, institutions without women CAOs, presidents, or board members are at a disadvantage. Having women in top leadership positions has significant positive outcomes for higher education institutions. Institutions with women CAOs experience larger increases in the growth of women faculty compared to institutions with men CAOs (Ehrenberg, Jakubson, Martin, Main & Eisenberg, 2009; National Resource Council, 2010). A larger share of women faculty fosters more diverse learning environments (Hurtado, Eagan, Pryor, Whang & Tran, 2012), increases the use of effective educational practices (Kuh, Laird & Umbach, 2004), and creates role models for women students (Bettinger & Long, 2005; Trower & Chait, 2002). Given these outcomes, hiring more women CAOs should be a strategic focus of research universities.

There are many explanations offered by the literature on why women are underrepresented in key leadership roles within academia. In this chapter I introduce the most prominent explanations for the gender disparity in academic leadership, while also acknowledging the role of intersectionality in the career advancement of women of color in academia. I also offer alternative explanations that are not widely considered by the extant literature including differences in accumulated forms of human, cultural, and social capital. Differences in key forms of capital can put aspiring women leaders at a disadvantage when it

comes to career opportunities and advancement. Prior research demonstrates that not all types of capital are equal. Among the different forms of capital, certain academic backgrounds, indicators of productivity, and academic institutions have greater prestige than others. The prestige economy that operates within academia elevates certain forms of capital over others. The greater the prestige of one's capital, the greater the opportunities and rewards that result from such capital. Unfortunately, women tend to have forms of capital that carry less prestige than men in academia, and in academic leadership in particular, tend to possess. Human capital, cultural capital, and social capital are interrelated and as a result, can create cumulative cycles of advantage or disadvantage.

By examining the education, backgrounds, experiences, and affiliations of the AAU CAOs, this research study identifies forms of capital that many of the AAU CAOs possess. By focusing on the relationship between key forms of capital a dominant archetype that is an AAU CAO emerges. The archetype, and the implications of its form, are presented in later chapters. While the dominant archetype highlights cumulative cycles of disadvantage many women in academia face, such information can help women aspiring to the role of CAO better prepare for and acquire relevant capital needed for the position at an AAU institution. Thus, this research study not only brings greater attention to the gender disparity in academic leadership, but it also uncovers strategic pathways for women's career advancement. In addition, this study offers guidance on structural reforms and needed changes in recruitment and talent development for the position of CAO at an AAU institution.

Background Context

The chief academic officer is the second in command of a college or university. The CAO oversees the curriculum and academic programs of the institution, teaching, and faculty

research and development. The CAO also supervises the budget, promotes diversity, and streamlines operations, among other duties. The CAO is the "indispensable bridge between the faculty and the administration" and has "a greater effect on the academic affairs of an institution than even the president" (Keim & Murray, 2008, p.121). The CAO is often a tenured faculty member that has ascended through the ranks of academic administration including serving as department head and Dean (Moore, Salimbene, Marlier & Bragg, 1983). The CAO has been referred to as the "first among equals" (Bowen, 2010), further underscoring the importance of the connection between the CAO and the faculty.

On the path to becoming a CAO, women and men tend to have slightly different career trajectories. Women CAOs are more likely than men CAOs to have previous CAO or senior executive experience (42%). Whereas men CAOs are more likely to have previously served as an academic dean or in other administrative positions within academic affairs (29.4% compared to 27.6%) compared to women CAOs (ACE, 2013b, 2017; Johnson, 2017). At AAU institutions in particular, 54% of the current provosts served as a dean prior to becoming CAO, or had dean in their title (June & Bauman, 2019). Women CAOs are also less likely to serve at multiple institutions on their pathway to becoming CAO compared to men (Johnson, 2017). Within community colleges, where women have reached parity with men at the CAO level, women CAOs are most often hired from within the institution (Cejda & McKenney, 2000). Among the AAU institutions, internal candidate hires are also the norm; almost two-thirds of the current AAU CAOs were internal hires. Interestingly, 12% of the current AAU CAOs were appointed at institutions where they were a graduate student (June & Bauman, 2019).

Upon examination of the profile of a CAO, there are differences observed across institution types. Among research universities and the AAU institutions in particular, 48% of the

CAOs have a PhD in a STEM field. Given that STEM fields tend to attract more research funding than other fields such as education or the humanities (NSF, 2017), and a large part of the CAO role is supervising the research enterprise of the institution, it is easy to see why hiring committees might prefer STEM candidates. Unfortunately, many STEM fields are dominated by men and can even be unwelcoming towards women students and faculty (Britton, 2017; Glass & Minnotte, 2010; Maranto & Griffin, 2011; Rincón & George-Jackson, 2016; Walton, Logel, Peach, Spencer & Zanna, 2015). The lower representation of women in fields that may be preferred for the CAO role could be contributing to women's underrepresentation in this position.

The gender disparity in academic leadership is most pronounced at research universities and other doctorate-granting institutions, which are widely considered the most elite (Yoder, 1991). However, the gender disparity is also present in other institution types. Women have not yet reached parity with men in the role of CAO at baccalaureate (40.8%) or masters degree granting institutions (42%) (Johnson, 2017). However, at two-year institutions, over half of the CAOs are women (58%), and women comprise more than 65% of senior academic positions (ACE, 2013a, 2013c; King & Gomez, 2008). While at a glance this seems encouraging, Townsend and Twombly (2007) find women are employed in greater numbers in postsecondary institutions that are lower in status, and that equity in the community college leadership has occurred because there is a high concentration of women students and faculty rather than through proactive efforts to recruit women into leadership positions. Kulis (1997) reported similar findings: Women are more likely to be employed in institutions where there are higher proportions of women administrators and students, less emphasis on research, less endowed revenue, and more reliance on federal funding. The research suggests women's representation

declines as institutions become more prestigious (Marschke, Lauren, Nielsen & Dunn-Rankin, 2007).

There are many other reasons women are underrepresented in top leadership positions within higher education and at research universities in particular. First, women are leaking out of the academic career pipeline, or not choosing to enter academia at all. Even though female students have earned half or more of all baccalaureate and doctoral degrees for the past decade (Johnson, 2017), too few women are choosing to take faculty jobs or remain in higher education. Women are leaving academe pre or post doctorate for non-higher education jobs where there are less systematic barriers and structural inequities, more welcoming climates, and supportive cultures (Marschke et al., 2007; Van Anders, 2004; Wolfinger, Mason & Goulden, 2008). Women that do to choose to work in academia are leaking out of the pipeline as a result of incongruities between work and family life (e.g., birth of child, dual careers, and other family-related responsibilities) (Marschke et al., 2007), and are not progressing through the pipeline at the same rate as men (Johnson, 2017; U.S. Department of Education, 2016). National Center for Education Statistics (NCES) 2017 faculty data indicates only 37.4% of tenure-track faculty at research universities are women, and just 26% have achieved the rank of full professor (Gonzalez, 2001; Johnson, 2017; Niemeier & Gonzalez, 2004; U.S. Department of Education, 2016; West & Curtis, 2006). According to a TIAA Institute (2016) report, the gender gap in faculty appointment types is still an issue at research universities, where the ratio of tenured men to women is 1.3 to 1 (Finkelstein, Conley & Schuster, 2016). Thus, the academic career pipeline is mired with obstacles that make it difficult for women to survive and thrive in academia, especially at research institutions.

Second, research also suggests that women are not only leaking out of the academic pipeline but are being pushed out. A lack of critical mass in many academic disciplines creates chilly or foggy climates for women faculty (Carrigan, Quinn & Riskin, 2011; Lennartz & O'Meara, 2018; Xu, 2008). Feelings of isolation due underrepresentation creates a negative feedback loop that is difficult to break- "few women want to go to places where few women are" (Steffen-Fluhr, 2006, p.3). Given that the majority of CAOs at research universities come from STEM disciplines, increasing the number of women pursuing STEM degrees is crucial to improving women's representation in the faculty and the administration at this institution type. The first step, as articulated by Alice Hogan, NSF's former ADVANCE Program Manager, is "Ensuring that the climate, the policies and the practices at these institutions encourage and support the full participation of women in all aspects of academic life, including leadership and governance" (National Science Foundation, 2001, para 2).

Third, inequities in workload make it unlikely women achieve the qualifications needed to be competitive for leadership positions (Misra et al., 2011; O'Meara, Kuvaeva & Nyunt, 2017). Research demonstrates women faculty take longer to reach the rank of full professor and spend more time in faculty positions prior to becoming CAO (McKenney & Cejda, 2000). This differential time to promotion between men and women faculty is a result, in part, of workload inequities and the tendency for women faculty to spend more time on teaching and service activities, and less time on research (Link, Swann & Bozeman, 2008; Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva & Nyunt, 2017). Such time allocation has been correlated with differential career progress and decreased satisfaction with workload and faculty careers among women (Carrigan, Quinn & Riskin, 2011; Misra et al., 2011; Park, 1996). It is not that women are necessarily choosing to spend more time on service or teaching over research, but

inequities in how work is distributed and taken up can funnel women into more service roles (O'Meara, Kuvaeva & Nyunt, 2017; O'Meara, Lennartz, Kuvaeva, Jaeger & Misra, 2019). For women faculty of color in particular, "cultural taxation" and "tokenism" contribute to workload inequities. Institutional demands for diversity on service committees over-burden faculty of color with service responsibilities and limit the amount of time they have to devote to research (Baez, 2000; Harley, 2008; Tierney & Bensimon, 1996; Turner & González, 2011). Workload inequities slow women's advancement from associate to full professor which in turn creates smaller pools of women full professor candidates for positions that feed into the CAO position (ACE, 2007, 2012; Kelly, 2011). Said another way, men's faster advancement from associate to full professor is a strategic advantage in the career pathway to CAO.

A fourth reason women are underrepresented among tenured faculty and the leadership is a lack of mentoring and access to professional networks that support their advancement (Dean, 2008; O'Meara, 2016; Perna, 2001; Tierney & Bensimon, 1996). Mentors and professional networks can provide strategic advice and clarity around advancement criteria, insight into the inner-working of an organization, and access to professional development opportunities- all of which are critical for advancement into leadership positions (Eddy, 2008; Kelly, 2011; Niehaus & O'Meara, 2015). However, many women faculty and administrators feel isolated and do not have access to a professional network which has negative implications for career advancement (Steffen-Fluhr, 2006). Alternatively, we know that women who do find or create leadership networks through programs like HERS and ELAM are more likely to pursue leadership positions and overcome obstacles in their career advancement (Dannels et al., 2009; McDade., Richman, Jackson & Morahan, 2004).

Fifth, gender norms and family obligations also play a critical role in women's career progression and time to advancement (Eddy, 2008; Eddy & Cox, 2008; Leatherwood & Williams, 2008; O'Laughlin & Bischoff, 2005; O'Meara & Campbell, 2011; Mason, Wolfinger & Goulden, 2013; Ward & Wolf-Wendel, 2012). Many women faculty have strong commitments to their family and struggle to devote the same amount of time as men to research and other scholarly endeavors (Bain & Cummings, 2000). Williams (2000) observed women professionals in particular struggle to meet the standards of the "ideal worker" (p. 17). Within academia, the ideal worker is someone who is "married to his or her work, can move at will, and works endlessly to meet the demands of tenure" (Wolf-Wendel, 2004, p. 237). Gender norms make it difficult for women to be both the "ideal worker" and caretakers of their family and household. For women faculty of color, gender norms are further compounded by race; cultural factors often conflict with ideal worker norms (Turner & Gonzalez, 2011). Overall, the research suggests gender norms and role incongruities around work and life influence the career decisions of women including the type of institution where they choose to work or continue to work.

Career decisions are also heavily shaped by family. Cejda and McKenney (2000) found that on the pathway to becoming a CAO, most of the women faculty in their study stayed within their state of domicile to achieve tenure. Likewise, Kelly (2011)'s study of women CAOs found women were geographically restricted and less likely to make lateral career moves due to childcare and family obligations. Given that academic reward systems favor faculty cosmopolitans (Rhoades, Kiyama, McCormick & Quiroz, 2008), being location-bound could negatively impact women's pathways to promotion. Ross and Green (1990) argue that higher education institutions in the US have a pecking order and that it is difficult to be promoted into a position at an institution of greater prestige without making a lateral move first. Other literature

suggests that elite colleges and universities tend to preserve and improve their reputations by hiring from each other (Burris 2004; Kennedy 1997). In other words, it is difficult to be promoted into leadership roles at AAU or other elite research institutions unless one is already working at one. Thus, if a woman seeking a tenure-track faculty position does not take a job at this type of institution, or make a lateral move early in her career, it is unlikely that she will be able to make this move later in her career when she is applying for the position of CAO at an AAU institution.

Finally, women applying for leadership positions often face bias in the hiring process that prevent them from advancing into leadership roles (Blair-Loy et al., 2017; Glass & Minnotte, 2010; Quadlin, 2018; Sheltzer & Smith, 2014). The broader literature on employment suggests women tend to only apply for jobs if they hold all the qualifications listed in the job description, or when they are over-qualified for the position (Mohr, 2014). There is also research demonstrating implicit and explicit biases of hiring committees surrounding agency, competence, brilliance, and experience that advantage male candidates (Leslie, Cimpian, Meyer & Freeland, 2015; Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2012; Phelan, Moss-Racusin & Rudman, 2008; Pitts, 2017). Women tend to be held to a higher standard for leadership competence than men. Research has shown women candidates have to prove their abilities to a greater degree than men candidates when being considered for leadership positions (Avolio, Gardner, Walumbwa, Luthans & May, 2004; Eagly & Carli, 2007). Women of color in senior academic leadership positions report experiencing even greater scrutiny than white women concerning their experience and credentials (HERS, 2014). Similarly, studies have shown that self-promoting behavior that highlights competence produces positive outcomes for men, but makes women appear less likeable and less hirable (Ridgeway, 2001; Rudman & Glick, 2001).

These findings indicate that women may be self-selecting out of the hiring process if they feel they are not overqualified for the position. Women that do apply and go through the interview process, often face implicit and explicit bias from the hiring committee. Such bias more often favors candidates who are men over women (Blair-Loy et al., 2017; Glass & Minnotte, 2010; Quadlin, 2018; Sheltzer & Smith, 2014).

For these reasons, women continue to be underrepresented in the rank of full professor and in academic leadership within higher education institutions and research universities in particular. Although issues with the academic pipeline, a lack of critical mass, workload inequities, incongruities between gender roles and work-life balance, unequal access to professional networks, and bias in hiring are not the only explanations for differential progress among men and women in academia, they are compelling contexts offered by the extant literature. In chapter two each of these sources of differential career advancement is examined in greater detail.

Guiding Theory

Three inter-related theories guided this research study: human capital theory, cultural capital theory, and social capital theory. This section introduces each of these theories and how they were used to construct my theoretical framework.

Human Capital

Human capital is defined as the knowledge and skills that individuals accumulate over time such as education, training, and work experience, that can be exchanged for higher earnings, power, and occupational status (Becker, 1993; Rosenbaum, 1986). According to human capital theory, "an individual's career progression and success is contingent upon the quantity and quality of human assets one brings to the labor market" (Ballout, 2007, p.743). Research on

human capital theory find education and experience to be the strongest and most consistent predictors of career advancement (Naff, 1994; Tharenou, Latimer & Conroy, 1994; Tharenou, 2001).

The influence of human capital on career opportunities and advancement often differs based on organization type. Given that higher education institutions confer credentials, and place a high value on having such credentials, human capital may be more coveted in higher education than in other field or organizations. Research has shown a significant amount of human capital is expected among those entering CAO roles including but not limited to a terminal degree, tenure, and prior leadership experience within higher education (ACE, 2013a, 2013b, 2017; Johnson, 2017; June & Bauman, 2019). Interestingly, when organizations possess large quantities of human capital (e.g. advanced degrees), the quality of the credentials and experience may matter more than in other organizations (Dimov & Shepherd, 2005). Quality in higher education is often attributed with selectivity or prestige (Kuh & Pascarella, 2004). Since the AAU institutions are among the most selective and prestigious universities in the U.S., certain types of human capital may be considered higher quality, and more commonly sought after in CAOs by this institution type. This research study distinguishes between different forms of capital that are associated with achieving the position of CAO at an AAU institution. Thus, human capital theory serves as framework to explain the relationship between credentials, skills, and experience considered necessary for the role of CAO.

Given the literature demonstrating the role of human capital in career advancement, I examined several forms of human capital among the AAU CAOs in this study including *Prior experience*, *Academic career*, *Terminal degree discipline*, *STEM designation*, and finally, *Hire type.*

Cultural Capital

The father of cultural capital theory, Pierre Bourdieu, defined cultural capital as the cultural background, knowledge, experiences, disposition, and skills that are transmitted from one generation to the next (Bourdieu, 1986). To be a form of cultural capital, such background, knowledge, skills and so forth must be widely recognized as high-status cultural signals, or status markers (Lamont & Lareau, 1988). As a result, this form of capital is exclusionary, resulting in certain forms of cultural capital carrying greater status and prestige than other forms. Reputation, or prestige, in the academic community is the highest marker of status (Becher & Trowler, 1989). Thus, prestige is converted to cultural capital through its symbolic power as a status marker (Grenfell & James, 1998).

Much of the existing research on the cultural capital within academia relates to the prestige of academic institutions (Blackmore, 2015; Blackmore & Kandiko, 2011; Burris, 2004; Farnum, 1990; Morrison, Rudd, Picciano & Nerad, 2011; Oprisko, Dobbs & DiGrazia, 2013) and the influence of prestige on academic careers (Ali, Bhattacharyya & Olejniczak, 2010; Bland, Center, Finstad, Risbey & Staples, 2005; Clauset, Arbesman & Larremore, 2015; Fowler, Grofman & Masuoka, 2007; Headworth & Freese, 2016; Oprisko, 2012; Melguizo & Strober, 2007; Tötösy de Zepetnek & Jia, 2014). This body of research suggests different forms of cultural capital have varying levels of prestige in academia, and that more prestigious cultural capital enables greater career success and opportunities to accrue more prestige in one's career. While much of the research to date has focused on the effects of prestige on faculty careers rather than CAOs, we can still gain relevant insights into the influence of cultural capital on the path to the position of CAO from this body of work. Specifically, the research on faculty placement and hiring informs us that institutions of similar status or prestige hire from one another (Coate & Kandiko Howson, 2016; Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013)

12

which suggests a significant advantage for individuals that have graduated from or are affiliated with prestigious institutions. Certain academic disciplines are also considered higher in status than other disciplines. Faculty in higher status disciplines tend to have access to greater tangible and intangible rewards such as higher salaries, selection for awards, and greater social influence (Blackmore & Kandiko, 2011). Existing research also suggests that the prestige of faculty generally increases throughout their career; as faculty accumulate forms of cultural capital over time such as research publications, impact upon the field, research grants, and scholarly awards, they generate greater prestige over time (Ali, Bhattacharyya & Olejniczak, 2010; Blackmore & Kandiko, 2011; Hirsch, 2005). Such forms of cultural capital are especially important in promotion decisions and can influence the trajectory of academic careers.

Given this body of knowledge, several measures of cultural capital were examined among the AAU CAOs in this study including *Status of discipline*, *Prestige of academic institutions*, *Research publications, H-index score*, and *Research grants*.

Social Capital

Like cultural capital theory, social capital theory was first introduced through the work of Pierre Bourdieu. Social capital is defined as the ability of actors to secure benefits by virtue of membership in social networks or other social structures (Portes, 1998). Such benefits, or resources, are accessed and mobilized through ties to other actors in the social network. According to Bourdieu (1986), the amount of social capital possessed by an actor depends on both the number of network connections that the actor can mobilize, and the sum of the amount of capital that each network member possesses. In other words, the number of connections to networks or social structures, and the amount of social capital those networks and structures contain, determines the amount of social capital an individual possess. Similar to cultural capital,

certain forms of social capital are higher in status than other forms. Individuals that are members of more prestigious social networks and social structures accrue more social capital than those that are members of less prestigious networks and structures. Thus, social capital explains how social relations that are formed through networks and social structures can create career opportunities and resource advantages for members (Ibarra, Kilduff & Tsai, 2005; Kilduff & Tsai, 2003).

Within higher education, social capital can be accrued through affiliations and relationships. Institutions of greater prestige confer greater social capital to individuals who are affiliated with the institution. Graduates of prestigious universities benefit from this social capital through access to a network-based system of affiliation that enables future career success (Oprisko, Dobbs & DiGrazia, 2013). Elite academic programs tend to hire graduates or faculty from other elite programs and institutions (Coate & Kandiko Howson, 2016; Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013) underscoring one such benefit of affiliation. Likewise, professional organizations confer social capital upon its members by supplying a network of connections that can provide access to information, influence, resources, and career sponsorship (Christakis & Fowler, 2009; Ibarra & Deshpande, 2004; Ibarra et al., 2005; Lin, 1999; Niehaus & O'Meara, 2015; Seibert et al., 2001). The relationship that exists between a PhD student and their academic advisor and dissertation committee members is another way social capital is accrued and transferred through connections or relationships. The social capital of the academic advisor and dissertation committee members is transferred, to an extent, to the PhD student (Godechot & Mariot, 2004). Research demonstrates the reputation of a candidate's advisor and dissertation committee members is positively associated with obtaining a tenure track faculty position (Godechot & Mariot, 2004). Thus, social capital is an important form of capital for

individuals within academia to possess. Greater social capital results in more status, recognition, and legitimacy for faculty members in particular (Niehaus & O'Meara, 2015).

Given the importance of social capital in faculty careers, social capital is likely also an important form of capital for an AAU CAO to possess. Two forms of social capital were examined among the AAU CAOs in this research study: *Academic institution affiliations* and *Professional organization affiliations.*

Statement of the Problem

A recent study conducted by June and Bauman (2019) provides a snapshot of the profile of the CAOs of the AAU intuitions. Using publicly available information found online, June and Bauman (2019) created a database containing demographic information for 201 current and former AAU CAOs. Prior to this study, it was unknown whether the typical profile of a CAO – a white man with a doctoral degree in the humanities, fine arts, religion, or the STEM fields – and the differences between men and women CAOs (degree type, discipline, and prior CAO experience) extended to the most elite research universities (ACE, 2013; Johnson, 2017). Unfortunately, the data indicate the typical CAO profile, and gender differences that appear across other institutional types, are even more pronounced among the AAU institutions. For example, 75% of the AAU CAOs in June and Bauman (2019)'s study are white men, and more than half have a degree in a STEM discipline. From the few studies of CAOs that exist, we also know men and women tend to have different career paths. Women are more likely to have prior CAO experience, whereas men are more likely to have previous academic dean or other executive academic affairs experience (ACE, 2017; Johnson, 2017). However, it is unclear whether other aspects of the professional backgrounds and experiences of women CAOs such as research collaboration, previous position and institution of employment, tenure, and

undergraduate and graduate institution affiliations, are more similar or dissimilar than the backgrounds and experiences of the men CAOs in the AAU.

Differences in the various forms of human capital, cultural capital, and social capital of the men and women AAU CAOs are important to understand because they have implications for women's representation and full participation in this role in the future. For instance, if more AAU institutions are hiring CAOs with a background in the STEM disciplines, it could negatively impact women because of the barriers they face within these fields including isolation, lack of time for research, and greater time to advancement (Barrett & Barrett, 2011; Buckley, Sanders, Shih, Kallar & Hampton, 2000; Cejda, 2008; Kelly, 2011; Lennartz & O'Meara, 2018; O'Meara, 2011, 2016; Perna, 2001; Tierney & Bensimon, 1996; Sax, Hagedorn, Arredondo & Dicrisi, 2002). A study conducted by Kelly (2011) of women CAOs employed at different institutions suggests there is a preference for STEM backgrounds among CAO hires. One woman CAO in the study shared that her academic discipline lacked "cache" because it was in an applied field rather than science or engineering. Another woman CAO explained how during her job search process, her lack of a scholarly record was an impediment, and that remaining active in your field builds credibility (Kelly, 2011). Research on faculty careers provides evidence that women faculty spend less time on research (Creamer, 1998; Misra et al., 2011) and produce fewer research publications than men (Brown & Samuels, 2018; Lone & Hussain, 2017; Strand & Bulik, 2018; Van den Besselaar & Sandström, 2017). If the women in Kelly (2011)'s study were applying for the role of CAO at an AAU institution, these findings could underscore barriers facing women with backgrounds outside of the STEM disciplines and a less impressive scholarly record as a result of greater time spent on teaching and service activities.

The literature also establishes women CAOs are less likely to serve at multiple institutions on their pathway to becoming CAOs compared to men and are more likely to be promoted within their institutions into other administrative positions (ACE, 2009, 2013; Kelly, 2011). However, research suggests that many tenure-track women faculty and women CAOs are employed at less prestigious colleges and universities (Johnson, 2017; Townsend & Twombly, 2007), either by personal choice (Perna, 2001; Ward & Wolf-Wendel, 2004) or by structural forces (Perna, 2005; Smart, 1991). As a result, tenure-track women faculty are underrepresented within research institutions. In addition to these findings, the fact that the majority of the current CAOs of the AAU institutions were internal hires suggests there is a shortage of women candidates that could be considered for the position of CAO within an AAU institution. The tendency for hiring committees to more heavily scrutinize the performance record of internal candidates (Birnbaum, 1988) further reduces women candidates' likelihood of being selected for a CAO position.

Finally, research also demonstrates the negative impact implicit bias has in the hiring process for women candidates (Moss-Racusin et al., 2012; Sheltzer & Smith, 2014). Women tend to be more heavily scrutinized and have to demonstrate a higher level of competence than an equally qualified man (Corley, Bozeman & Gaughan, 2003; Eaton, Saunders, Jacobson & West, 2019; Foschi, 2000). To demonstrate competence, women AAU CAOs may have greater experience and/or longer academia careers than their male counterparts. Thus, men may have a strategic advantage in that they can pursue the CAO position earlier in their career. Women may also demonstrate competence by the status of their academic disciplines and academic pedigree. Women with a background in a higher status field or with an affiliation to a prestigious academic

institution may signal greater ability and competence to the hiring committee. All of the factors presented could be contributing to women's underrepresentation as CAO of an AAU institution.

Purpose of the Study

Given the underrepresentation of women CAOs at the elite research universities, there is a need to better understand the credentials, backgrounds, and experiences of CAOs (forms of human and cultural capital), the influence of prestige as it relates to CAO's academic disciplines, institutional affiliations, and scholarly achievements (forms of cultural capital), and institutional and professional affiliations that may aid in the career advancement of CAOs (measures of social capital). Such examination can illuminate gender differences that may be contributing to women's underrepresentation in the role of CAO at the AAU institutions. Therefore, the purpose of this study was twofold: (1) Identify key forms of human capital, cultural capital, and social capital among CAOs at the 63 research universities within the AAU, and (2) Examine if there are gender differences among men and women CAO's accumulated forms of capital.

Research Questions

The following three research questions were developed and examined through this research study:

1. What are key forms of human capital accumulated by CAOs of AAU institutions from 2008 to June 2020? 1a). What gender differences, if any, exist in the human capital of the CAOs of the AAU institutions?

2. What are key forms of cultural capital accumulated by CAOs of AAU institutions from 2008 to June 2020? 2a). What gender differences, if any, exist in the cultural capital of the CAOs of the AAU institutions?

3. What are key forms of social capital accumulated by CAOs of AAU institutions from 2008 to June 2020? Do any common professional affiliations emerge among the CAOs in this study?

Research Methods

Few databases exist on CAOs, and many are either not publicly available or do not contain the granular level of data needed to study the current state of AAU CAOs. The American Council on Education (ACE) conducts a survey of CAOs every four years and releases descriptive findings through infographics. The findings of the ACE CAO survey are very high-level and the data behind the infographics is not publicly available. June and Bauman (2019) however, created a more granular database of the CAOs of the AAU institutions from 2008 to January 2019 by collecting publicly available information on immediate prior position and institution of employment, academic background (including degree type and STEM designation), years of experience, position taken after the role of CAO (when applicable), and other demographic characteristics such as age, gender, and race. I was fortunate enough to gain access to this database. Through this dissertation I built upon this database by collecting additional demographic data as well as data on several measures of human capital, cultural capital, and social capital outlined below.

Measures of Human Capital

Several measures of human capital were examined in this research study including *Prior experience*, as determined by *Title of immediate prior position* and *Length of time in immediate prior position*, *Academic career*, as determined by *Tenure status* and *Length of time in academic career*, as determined by time at first tenure-track faculty appointment and current AAU CAO appointment, *Terminal degree discipline* as determined by *CIP classification* and *STEM designation* of the CAO's terminal degrees, and *Hire type (*whether they were an internal or

external hire). Many of these variables have been employed by other higher education researchers and social scientists as measures of human capital in faculty studies (Perna, 2003; Toutkoushian, 2002, 2003; Umbach, 2007, 2008), and are widely viewed as appropriate indicators or proxies of human capital. However, this research study is the first of its kind to examine *Prior experience* and *Hire type* as measures of human capital among AAU CAOs.

Measures of Cultural Capital

Several measures of key forms of cultural capital were also examined including: *Prestige of undergraduate institution, Prestige of graduate institution,* and *Prestige of immediate prior institution of employment,* as determined by AAU, Ivy League, and Carnegie Classification (R1) status, *Status of discipline,* as determined by Biglan's typology of Hard-Soft and Pure-Applied disciplines, *Research publications*, operationalized as the total number of publications, total number of first author publications, and total number of co-authored publications for each AAU CAO in the sample, *h-index score,* as determined by each AAU CAO's h-index score as calculated by Google Scholar, and finally, *Research grants,* operationalized as the total number of research grant awards, and the total award value of all research grants among the AAU CAOs in the sample.

The higher education literature on institutional prestige commonly uses AAU affiliation and R1 status (Ali, Bhattacharyya & Olejniczak, 2010; Eshelman, Sullivan, Parker & Levin, 2000; Fairweather, 2002; Liebert, 1976), as well as membership in the Ivy League (Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013), as indicators of prestige within academia. The *status of academic disciplines* has also been previously examined by higher education scholars using Biglan's typology of Hard-Soft and Pure-Applied disciplines (Perna, 2001) and thus are reliable measures of cultural capital. This research study contributes to the literature by also examining

research publications, h-index scores, and *research grants* as forms of cultural capital held by the CAOs of the AAU.

Measures of Social Capital

Two measures of social capital were also examined in this research study: *Academic institution affiliations* and *Professional organization affiliations. Academic institution affiliations* refers to the names of the academic institutions each AAU CAO is affiliated with including their undergraduate institution, graduate institution, and immediate prior institution of employment. *Professional organization affiliations* refers to the names of the professional organizations each AAU CAO is affiliated with. This is the first study of its kind to examine the academic institution and professional organization affiliations as measures of social capital among the CAOs of the AAU institutions and to identify common affiliations among the CAOs of the AAU institutions.

Data Analysis

Several quantitative methods were employed in this exploratory research study to examine my research questions including descriptive statistics, t-tests for independent means, and Chi-square analysis. I first ran descriptive statistics (frequencies, means, and standard deviations) on the key measures of human capital, cultural capital, and social capital to identify common forms of capital among the AAU CAOs. I then employed either t-tests or chi square analyses depending on the nature of the variable under study to determine whether any gender differences exist (See Table 2 for the list of tests performed on each variable). The results of each of these analyses provided insight into the different forms of capital the CAOs of the AAU possess as well as gender differences that exist. These results are presented in chapter four of this

dissertation, and the implications of these results are explored in chapter five as they relate to women's underrepresentation in the role of CAO at the AAU institutions.

Significance

Studying the career pathways of women CAOs at the most prestigious research universities is critical. Women are significantly underrepresented among CAOs in research universities. This is a problem for institutions that wish to remain leaders in attracting talented faculty, achieving positive student learning outcomes, and conducting cutting-edge research. Social science research has shown diversity in leadership leads to better decision making (Raatikainen, 2002), improves representation among women faculty (National Resource Council, 2010; Ehrenberg et al., 2009), and enhances student learning (Kuh, Laird & Umbach, 2004; Trower & Chait, 2002). These factors are all incredibly impactful to the success of a university. CAOs in particular, are instrumental in crafting the strategic vision and mission of the institution, determining faculty hiring and tenure decisions, and prioritizing student learning (Keim & Murray, 2008; Kuh, Douglas, Lund & Gyurmek, 1994; Moody, 2004).

Institutions with women presidents and chief academic officers, as well as a greater percentage of women on their boards of trustees, experience larger increases in the growth of women faculty compared to institutions with a homogenous leadership (Ehrenberg et al., 2009). Specifically, a board with at least five women on it has a statistically significant positive effect on the number of faculty that are female (Ehrenberg et al., 2009). Having a woman as the provost also has a significant effect on the mean year to year increase of women faculty (Ehrenberg et al., 2009). Thus, having a woman CAO at the helm of an institution can have substantial positive effects on the make-up of the faculty, which in turn, directly affects student learning outcomes, retention, and the career choices of students. This is evidenced by women faculty's greater

22

likelihood of using high impact teaching and learning practices (Hurtado et al., 2012), and the role mentors play in retaining underrepresented students in STEM fields (Bettinger & Long, 2005; Trower & Chait, 2002).

Given that the most common pathway to the position of CAO is through the faculty ranks, improving the representation of women on the tenure track and in male-dominated fields creates more opportunity for women to become a CAO. However, it is imperative that we also understand the key forms of capital needed for the role of CAO at an AAU institution. Insight into the different forms of capital possessed by the AAU CAOs can enable the career advancement of women; women aspiring to the role of CAO at an AAU institution can take strategic steps to acquire key forms of capital needed for the position. This research study also reveals the dominant form of an AAU CAO, and the implications this form has for women aspiring to the role of CAO at an AAU institution particularly in regard to the unique challenges women face as they navigate the career pathway to CAO. In sum, this research study is the first of its kind to identify similarities and differences in key forms of human capital, cultural capital, and social capital among the AAU CAOs, and thus makes a unique contribution to the broader literature on chief academic officers and women leader's career pathways in academia.

Chapter Two

In this chapter I provide a review of the literature that explores the path to the provost's office. I begin by examining key sources of differential career advancement among women that may be contributing to the underrepresentation of women CAOs at the AAU institutions. Particular attention is given to women and women of color's career pathways and the backgrounds and experiences, indicators of prestige, and affiliations that may impact career advancement. I then provide a summary of the existing literature on CAOs within research universities- the focus of this study. I conclude this chapter by introducing the three theories that guide this research study: human capital theory, cultural capital theory, and social capital theory and how the existing research on these theories informed my research questions.

Sources of Differential Career Advancement

Given that women outnumber men in obtaining a terminal degree in several fields, it would seem surprising that there are not more women in the position of CAO at research universities or other doctorate-granting institutions. However, it is well documented in the literature that women faculty take longer than men to advance from associate to full professor, or never reach the rank of full professor, during their academic careers in research universities (Britton, 2009, 2017; Johnson, 2017; Misra et al., 2011; Modern Language Association, 2009). While this is true for all women faculty across institution types, the trend is exacerbated for women faculty of color (Johnson, 2017). A number of explanations have been posited for why such differential progress exists. Some explanations suggest women (1) are leaking or being pushed out of the academic pipeline (Marschke, Laursen, Nielsen & Dunn-Rankin, 2007; Van Anders, 2004; Wolfinger, Mason & Goulden, 2008), (2) feel isolated as a result of a lack of critical mass in certain disciplines (Carrigan, Quinn & Riskin, 2011; Xu, 2008), (3) experience

inequitable workloads that hinder advancement (Misra et al., 2011; O'Meara, Kuvaeva & Nyunt, 2017), (3) have difficulty balancing work and life (Cress & Hart, 2009; Misra, Lundquist & Templer, 2012; Sallee, 2012, 2013; Reddick, Rochlen, Grasso, Reilly & Spikes, 2012), and (4) have to navigate a foggy climate around tenure and promotion (Beddoes & Pawley, 2014; Lennartz & O'Meara, 2018). Once women faculty achieve tenure or consider moving into academic administration, structural constraints (Perna, 2005; Shaw & Stanton, 2012; Smart, 1991) and bias in hiring (Blair-Loy et al., 2017; Glass & Minnotte, 2010; Konrad & Pfeffer, 1991; Quadlin, 2018; Sheltzer & Smith, 2014) create barriers in career advancement. Taken together, each of these explanations shape the underrepresentation of women CAOs in research universities.

Faculty Pipeline

The academic pipeline refers to institutional forces that influence women students' decisions to pursue advanced degrees or enter the academic profession, and hinder women faculty's progression through the academic ranks and decision to remain within academia (Kulis, Sicotte & Collins, 2002). The pipeline metaphor is most commonly applied to women students studying STEM fields and assuming faculty positions within STEM fields because of "leakages" observed along the pipeline wherein women choose other fields of study or leave academia altogether. However, women are "leaking" out of the academic pipeline in other fields as well. Since 1996, the share of female doctorate recipients has grown from 45% to 51% with women earning the majority of doctorates awarded in life sciences (55%), psychology and social sciences (59%), education (70%), and humanities and the arts (52%) (NSF, 2018). Despite the fact that more women are pursuing advanced degrees, women continue to be outnumbered by men within the faculty. NCES (2017) faculty data indicate women account for only 31% of full

professors at all institution types. The data also indicate underrepresented minority women, who comprise less than 1% of tenured faculty across institution types, are less likely than either white women or underrepresented minority men to achieve the rank of full professor and to be awarded tenure (Johnson, 2017; NCES, 2017; Leggon, 2001; Nelson & Rogers, 2003; Trower & Chait, 2002) and are often held to higher standards than their white colleagues with regard to expectations for tenure and promotion (Matthew, 2016; SSFNRIG, 2017). Given that tenure is typically a qualification needed for the role of chief academic officer, the underrepresentation of tenured women faculty is significant, as it limits the pool of qualified women applicants for the role (Kelly, 2011).

One issue with the pipeline metaphor however, is that it assumes that by increasing the number of women graduate students, more women will enter academia and progress through the faculty ranks (Kulis, Sicotte & Collins, 2002). The findings of scholars like Monroe and Chiu (2010) and Kulis and colleagues (2002) debunk this assumption by finding that despite women's increased representation in the doctoral candidate pool, tenured women faculty representation in all science fields remains drastically low. Women are continuing to fall out of the academic pipeline and not progress through the faculty ranks for a number of reasons, chief among them feelings of isolation, chilly climates, and a lack of critical mass within many departments and disciplines (Carrigan, Quinn & Riskin, 2011; Kemelgor & Etzkowitz, 2001; Kulis, Sicotte & Collins, 2002; Xu, 2012). The argument can also be made that women are not simply falling out of the academic pipeline, but are actively being pushed out as a result of structural constraints such as unwelcoming environments and unsupportive institutional policies.

Feelings of isolation. Women faculty in research universities and in STEM fields in particular frequently report feelings of isolation within their department, their discipline, and

their institution (Kemelgor & Etzkowitz, 2001; Liang & Bilimoria, 2007; Rosser, 2004). In a study of twenty-one departments at high research activity universities, Kemelgor and Etzkowitz (2001) found women scientists were more likely than men to experience feelings of isolation and exclusion during their academic career, while men scientists were more likely to experience a sense of belonging and access to informal, yet crucial professional networks. Unequal access to informal professional networks can be detrimental to women faculty because ordinary information and collegial support becomes less accessible, making it more difficult for women to establish research lines and collaborations, and secure grants (Kemelgor & Etzkowitz, 2001). Although many women faculty have developed strategies to cope with feelings of isolation such as finding collaborators in other departments or at other universities (A Study on the Status of Women Faculty in Science at MIT, 1999), or interacting with other women who are experiencing the same problems (Liang & Bilimoria, 2007), many women faculty achieve less success in science, or leave academia altogether, as a result of this lack of interpersonal connections (Kemelgor & Etzkowitz, 2001).

Pairing women faculty and students with mentors has proved to be an effective strategy in reducing feelings of isolation within male-dominated fields. Among engineering faculty and students in particular, connection with a mentor has shown positive results in attracting and retaining women, and providing access to networks of other women and scholars in the field (Dunham-Taylor, Lynn, Moore, McDaniel & Walker, 2008; Ibarra, Kilduff & Tsai, 2005; Piercy et al., 2005; Pololi & Knight, 2005). Among minority faculty and minority leaders in academia, feelings of isolation and exclusion are higher than that experienced by their white counterparts (Laden & Hagedorn, 2000), and persist even after achieving tenure and high-profile academic leadership positions (Turner, Myers & Creswell, 1999). Faculty of color often find themselves

outside their departments' informal networks which results in feelings of isolation and difficulty in the socialization process (Blackwell, 1989; Boice, 1993). Networking with colleagues from other regional institutions and finding mentors outside of the department or institution can help reduce feelings of isolation among faculty of color, however (Turner, Myers & Creswell, 1999). Support for mentoring and networks for women and minority faculty are especially important in environments where women, and women of color have not attained critical mass (Burke & Mattis, 2007).

Critical mass. In the context of faculty, critical mass refers to the composition of one's department, and whether a person is nominally represented within their department. According to the literature on critical mass, departments with at least 30% of their faculty comprised of women have achieved critical mass (Etzkowitz, Kemelgor, Neuschatz, Uzzi & Alonzo, 1994; Xu, 2012). Achieving critical mass is important because women in disciplines with critical mass allocate their time in ways that are more aligned with their male colleagues compared to women in departments without critical mass (Carrigan, Quinn & Riskin, 2011). This alignment of work time has positive implications as it creates greater equity in productivity and advancement (Carrigan, Quinn & Riskin, 2011). In departments without critical mass, women faculty are more likely to experience increased teaching loads, less time for research, and produce fewer research publications which has negative implications for promotion and tenure (Xu, 2012).

According to Kanter (1977), small minorities (those constituting less than 15% of their environment) encounter greater discrimination, isolation, and performance pressures than larger minorities, or those with greater than 15% representation (Toren & Kraus, 1987). Due to their multiple marginality, women faculty of color are especially susceptible to feelings of isolation, stereotyping, and pressures to conform (Turner, 2002; Turner & Gonzalez, 2011). Lack of a

critical mass also makes it more difficult to break down stereotypes and perceptions about women's ability and suitability for 'men's work' (Burke & Mattis, 2007). According to Park (1996) "research is implicitly deemed as 'men's work' and is explicitly valued, whereas teaching and service are characterized as 'women's work' and explicitly devalued" (Park, 1996, p. 47). 'Women's work', or otherwise known as 'institutional housework' largely consists of undergraduate teaching and unrewarded advising (Kemelgor & Etzkowitz, 2001; O'Meara, 2016). Within the academic reward system, research is more highly valued than teaching or advising which can have negative implications for women who are tasked with such institutional housework at the expense of their research.

A lack of critical mass of women faculty can also exacerbate bias in faculty hiring decisions. Recent studies have revealed beliefs among hiring committee members that women are less likely to adopt or succeed within male models of career success (Kulis, Sicotte & Collins, 2002; Monroe & Chiu, 2010). Some fields, such as engineering and computer science, are characterized by male-centered career models that reward hyperachievement and total work commitment, to the exclusion of outside life commitments (Etzkowitz et al., 1994; Kemelgor & Etzkowitz, 2001). Many senior women faculty in STEM disciplines have adopted the values of male-centered career models in order to achieve career success. However, by perpetuating a male model of career success, departments are precluding women faculty from entering the field and from creating more welcoming and supportive environments for other women faculty. Thus, the continuation of male-centered career models supports structural constraints against women such as field fragmentation and segregation (Etzkowitz et al., 1994).

Structural Constraints

      Existing research suggests the differences in men and women's career paths are also associated with structural constraints imposed on women (Etzkowitz et al., 1994; Perna, 2005; Shaw & Stanton, 2012). According to structural theory, gender differences in the labor market experiences of faculty can be attributed to the segregation of women in the types of institutions, academic fields, and work roles that have lower prestige and value (Perna, 2005; Smart, 1991). Furthermore, women faculty are more likely than men to hold lower rank positions and work at institutions that typically have higher teaching loads, less support for research, more "token" service responsibilities, and lower pay (Fox, 1992; Misra et al., 2011). Smart (1991) measured field segregation among 2,968 faculty who were employed full-time in four-year colleges and universities across the U.S. using the following measures: prestige (Carnegie Classification; see Appendix C), institution control (public vs. private), financial health (institutional revenue), discipline type (using Biglan's (1973) typology), and percent of males in the discipline. Smart's (1991) findings indicate gender is more influential in the academic rank and salary attainment of faculty than institution type, discipline, or work roles. However, gender composition of the discipline or field is a significant intermediating variable. As gender composition improves, women's representation in the higher ranks and salary also improves (Smart, 1991), thus underscoring the importance of achieving critical mass.

      Similarly, Perna (2005) examined the segregation of women by academic field by measuring the representation of tenured women among full-time faculty at four-year institutions across academic disciplines using a descriptive and multivariate analyses approach. She found gender differences in tenure and rank are not eliminated when differences in measures of human capital, productivity, social networks, and family ties are taken into account. According to Perna (2005) this suggests, "either that the analytic model excludes or does not adequately measure all

30

of the relevant variables (Perna, 2001; Toutkoushian, 1999) and/or that institutional structures, policies, and practices disadvantage women but not men in the determination of tenure and rank (Johnsrud & Des Jarlais, 1994; Tierney & Bensimon, 1996)" (Perna, 2005, p. 300-301). However, these findings do not negate the necessity of further exploring the influence of networks on the career advancement of women in academia. The proxy for social networks that Perna (2005) used (percent of tenured women faculty in the field) does not fully measure access to professional networks. I build upon this work by employing more comprehensive proxies to measure access to potential professional networks by examining membership in professional organizations and affiliations with academic institutions.

Structural constraints can also manifest in other ways. According to Johnsrud and Des Jarlais' (1994), women faculty in their study perceived structural discrimination (e.g., sex discrimination, support for research on gender, childbearing leave policy), and personal discrimination (e.g., sex-role stereotyping, sexual harassment, sex discrimination) to be structural constraints negatively impacting their achievement of tenure. In support of these findings, Tierney and Bensimon (1996) contend 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. In their study of faculty socialization in academe, Tierney and Bensimon (1996) found many women faculty experienced gender-focused questions during their interviews, an unwelcoming environment to network with colleagues upon arrival, and stereotyping in advising assignments (Tierney & Bensimon, 1996). Among faculty of color, gender and racial bias are among the most troubling challenges they face in academe (Turner, Myers & Creswell, 1999). Such bias can create feelings of exclusion

unwelcoming and unsupportive work environments for faculty of color (Nevarez & Borunda, 2004; Settles, Buchanan & Dotson, 2019; Turner, Myers & Creswell, 1999).

Inequitable systems and structures are supported and reinforced by the individuals within the environment. To initiate change, those in positions of power need to lead by example and be willing to challenge previously accepted norms and institutional policies (Tierney & Bensimon, 1996). People in powerful positions—professors, department chairs, faculty senate officers, deans, provosts, and presidents— are "well-situated to articulate and perpetuate a university's prevalent culture" and norms (Trower & Chait, 2002, p. 36). However, because men tend to hold the positions of power within colleges and universities, it is more difficult for women faculty to reduce or eliminate structural barriers to change (Trower & Chait, 2002). Women faculty simply do not have sufficient power to impact the organizational culture and policy from within (Kanter, 1977; Nelson & Rogers, 2005; Xu, 2012). The same is true for women faculty of color; men of color tend to hold more full professor and leadership positions than women of color (Johnson, 2017). As such, it is important to study the backgrounds and experiences of women CAOs that are in the position to affect change, so that other women can make strategic career decisions to gain access to these powerful positions.

Workload

For women faculty on the tenure track, workload inequities can create cumulative disadvantages in their career progression. Differences in how men and women allocate their work time leads to inequities in workload, feelings of dissatisfaction, and greater time to advancement among women faculty. Several studies have shown that women faculty spend more time than men on less prestigious, time- consuming, and unrewarded campus service activities (Link, Swann & Bozeman, 2008; Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva

& Nyunt, 2017). According to the literature, women may be engaging in more campus service for several reasons. First, women are more likely than men to be asked to participate in campus service because (a) they add diversity to a committee, (b) they are more likely to say "yes," (c) they are perceived to be good at the task, and (d) they often have commitments to the activities being pursued (Babcock. Recalde & Vesterlund, 2017; Mitchell & Hesli, 2013; O'Meara et. al, 2019; Tierney & Bensimon, 1996; Vesterlund, 2015). For women faculty of color in particular, "cultural taxation" and "tokenism" are over-burdening faculty of color with service responsibilities and limiting the amount of time they have to devote to research (Baez, 2000; Harley, 2008; Tierney & Bensimon, 1996; Turner & González, 2011). However, many faculty of color note that it is hard to say "no" to campus service work especially when there are so few minority faculty to do this type of work (Griffin, Bennett & Harris, 2011; Turner, Myers & Creswell, 1999). Furthermore, faculty of color often see the cultural benefits associated with campus service, such as creating important opportunities for interpersonal and cultural connections, and may feel they have a responsibility to make a larger contribution to uplift their communities (Griffin, 2013). As a result of the factors mentioned above, women and faculty of color are spending more time than men on campus service activities and mentoring to the detriment of their academic careers.

Further compounding this issue is ambiguity around who is doing what within the department. Few departments track faculty work activities such as campus and department service (O'Meara, Kuvaeva & Nyunt, 2017; O'Meara et al., 2019). Ambiguity in who is doing what can result in unequal workload assignments and women taking on a greater share of service work than men (O'Meara et al., 2019). This is problematic because increased time spent on service activities has been correlated with lower research productivity, differential career

progress, and decreased satisfaction with workload and faculty careers among women (Aguirre, 2000; Bellas & Toutkoushian, 1999; Bird, Litt, and Wang, 2004; Carrigan, Quinn & Riskin, 2011; Link, Swann & Bozemann, 2008; Misra et al., 2011; Park, 1996). At research universities in particular, teaching and service are weighted less heavily than research in the academic reward system, so time spent on areas outside of research can be a disadvantage during the promotion and tenure process (Aguirre, 2000; Bellas & Toutkoushian, 1999; Carrigan, Quinn & Riskin, 2011; Link, Swann & Bozeman, 2008).

Guarino and Borden (2017) examined faculty work time using national data from the Faculty Survey on Student Engagement, as well as yearly activity reports of faculty at two research-intensive campuses. Using multiple regression modeling, they found women faculty reported, on average, 0.6 hours more service activities per week than men, and 1.4 more service activities per year. Another study conducted by Misra and colleagues (2011) found that women associate professors spent 25% of their work time on research, whereas men associate professors spent 37% of their work-time on research, using surveys and interviews with 350 faculty at an AAU institution. Similarly, Lennartz and O'Meara's (2018) study of associate professors at another AAU institution found women associate professors reported feeling less satisfied than men about the amount of time they spend on research compared to the time they spend on teaching and service.

It is important to note that women faculty do not necessarily want to be spending the majority of their work time on teaching and service, but inequities in workload distribution and ambiguity in who is doing what creates environments where inequitable workloads can persist (O'Meara, Kuvaeva & Nyunt, 2017; O'Meara et al., 2018; O'Meara et al., 2019). Inequitable workloads create cumulative disadvantages for women faculty which leads to greater stress,

increased time to advancement, and greater intent to leave (Eagan & Garvey, 2015; Hart & Cress, 2008; Watts & Robertson, 2011). As a result, women faculty may never progress to the rank of full professor and thus lack a qualification common amongst all AAU CAOs, or leave academia altogether. Both of these outcomes have negative implications for the representation of women in the role of CAO.

Foggy Climates

Aside from creating inequitable workloads, ambiguity can also be found in faculty evaluation criteria (Dovidio, 2001; Fox et al., 2007; Heilman, 2001). The promotion and tenure system within higher education has many of the characteristics of a "foggy climate" (Beddoes & Pawley, 2014; Lennartz & O'Meara, 2018). Specifically, the standards for tenure and promotion are unclear and there is little feedback or accountability for what counts and why. Women and underrepresented minority groups are more likely to be disadvantaged when standards for promotion and advancement are "foggy" (Beddoes & Pawley, 2014) because they tend to have less access to the types of collegial, professional, and social networks that communicate system knowledge and information necessary to prepare for advancement (Milem, Sherlin & Irwin, 2001; O'Meara, 2016; Perna, 2001; Tierney & Bensimon, 1996), and have minimal guidance and mentoring for reappointment, tenure and promotion (Padilla & Chávez, 1995; Turner & Myers, 1999).

Access to mentoring, networks, and knowledge about how to advance one's career is critical because formalized standards for promotion and tenure are rare and are often intentionally vague (Britton, 2010). Britton (2010) conducted interviews with 80 science, engineering, and math faculty at seven U.S. universities to identify factors affecting career advancement. She found that there were no statements or documentation about what was

35

required for promotion, or tenure, and in cases where there were statements or documentation, they were deliberately unclear (Britton, 2010). According to Britton (2010) this ambiguity leaves associate professors scrambling to figure out "unspecified elements" of what it takes to be promoted to full professor at their institution (p. 7). When promotion criteria are vague, and access to information that would clarify the promotion criteria is limited, women are disproportionately affected, resulting in diminished tenure chances.

Foggy climates also increase the likelihood bias will emerge in what work is assigned, taken up, and recognized in academic reward systems (Lennartz & O'Meara, 2018; O'Meara et al., 2017). Faculty of color report research on minority issues, or other "non-traditional" subjects, are not considered legitimate work, particularly if this research is published in "non-mainstream" journals (Turner, Myers & Creswell, 1999). According to Aguirre (2000) many white male faculty discredit feminist and minority research thus devaluing this type of research in the academic reward system and in tenure and promotion decisions. Faculty workload and reward systems with concrete and objective criteria, "mitigate the operation of prejudices" and inequities that might creep in (Beddoes, Schimpf & Pawley, 2014, p. 5). That is, when the standards for evaluation and advancement are clearly defined, biases and inequities in the tenure and promotion process are reduced (Babcock & Laschever, 2003; Lennartz & O'Meara, 2018). Taken together, ambiguity creates foggy climates that hinder women's ability to progress through the academic ranks and achieve tenure- steps necessary to prepare one for the role of the chief academic officer. Until institutions take the steps necessary to make tenure and promotion criteria more clear and professional networks more accessible, women will continue to be at a disadvantage relative to men. Longer time to promotion and tenure creates less opportunity for women to be qualified to transition into academic leadership positions.

Work-Life Balance

Although both men and women faculty struggle to balance personal and professional goals (Cress & Hart, 2009; Misra, Lundquist & Templer, 2012; Sallee, 2012, 2013; Reddick et al., 2012), many studies have found that women faculty tend to report higher levels of stress and difficulty balancing work and life (Jacobs & Winslow, 2004; Mason & Goulden, 2004; Mason, Wolfinger & Goulden, 2013; Misra, Lundquist & Templer, 2012; O'Laughlin & Bischoff, 2005; Ward & Wolf-Wendel, 2004; Winslow, 2010). Women faculty tend to report higher levels of work-life conflict, primarily due to the demands of raising children while navigating their careers (O'Laughlin & Bischoff, 2005; O'Meara & Campbell, 2011; Mason, Wolfinger & Goulden, 2013; Ward & Wolf-Wendel, 2012). Among faculty of color specifically, Black women faculty report significantly lower levels of work life balance than Black men faculty, while Latina women faculty report significantly higher work life balance than Latino men faculty (Denson, Szelényi & Bresonis, 2016). Both institutional type (Latz & Rediger, 2015; Wolf-Wendel & Ward, 2006), and disciplinary background (Wolf-Wendel & Ward, 2015) have also been linked to faculty members' experiences with work-life balance. Women with children and families at research universities in particular express greater difficulty managing research productivity and family life compared to men (Ward & Wolf-Wendel, 2004). Workload norms and research expectations of faculty employed at research universities make work life balance exceedingly difficult (Ward & Wolf-Wendel, 2004).

Related to work life balance is the notion of the "ideal worker" (Williams, 2000, p. 17). In academia in particular, "the ideal worker is married to his or her work, can move at will, and works endlessly to meet the demands of tenure" (Ward & Wolf-Wendel, 2004, p. 237). A faculty job on the tenure track requires almost complete dedication at the expense of everything else especially in early-career years, and is largely an individual profession, with individualized

results and rewards (Burke & Mattis, 2007). Gender roles make it difficult for women to be both the "ideal worker" and responsible for family members and their household. For women faculty of color, gendered norms are further compounded by race and culture (Turner & Gonzalez, 2011). Kachchaf et al.'s (2015) study of three faculty women of color revealed ways in which Black, Brown, and Indigenous women in STEM experience cumulative disadvantage as a result of their multiple identities that deviate from the ideal worker norm. Such deviation often led to unpleasant and discriminatory interactions with colleagues, feelings of insecurity, the perceived need to focus entirely on work responsibilities and hide family interests and obligations, and career choices that sometimes harbored significant personal compromises (Kachchaf, Ko, Hodari & Ong, 2015). While Ward and Wolf-Wendel (2004) found women faculty in research universities value the flexibility academic life offers, they also found it comes with a price: a never ending workload, the feeling of never having enough time in the day, ambiguity in tenure expectations, and the expectations to work a "second shift" at home (Ward & Wolf-Wendel, 2004; Wolf-Wendel & Ward, 2006). Thus, the literature suggests faculty at research universities struggle most with dedicating the time and effort necessary to succeed both at work and at home. As a result, many women are self-selecting into more family-friendly institution types (Perna, 2001; Ward & Wolf-Wendel, 2004). This is problematic because it is another factor compounding women's underrepresentation in the faculty and the leadership of research universities.

The prestige of an institution can make the balance between work and family even more difficult (Ward & Wolf-Wendel, 2004). In a study conducted by Ward and Wolf-Wendel (2004), women faculty at less selective research universities stated they were glad they were not at an elite institution because the workload pressures would be too difficult to manage while raising a

family (Ward & Wolf-Wendel, 2004). Similarly, Perna (2001) using a nationally representative sample of tenure- track faculty from the 1993 National Study of Postsecondary Faculty survey, found that many women faculty choose to pursue academic careers at less selective institutions so that they can better balance work and family life. Overall, the research suggests work-life balance and "ideal worker" norms may shape the type of institution women choose to work. Given these research findings, women faculty may be opting out of working at research universities for the flexibility and balance other institutional types offer.

Hiring Process

In addition to women opting out of faculty jobs at elite research universities, gender bias within the academic hiring process is precluding women from entering the faculty and academic administration (Blair-Loy et al., 2017; Glass & Minnotte, 2010; Konrad & Pfeffer, 1991; Quadlin, 2018; Sheltzer & Smith, 2014). One source of gender bias exists in letters of recommendation written for faculty job candidates across fields and disciplines. Several studies have analyzed letters of recommendation written for men and women faculty candidates and have found evidence suggesting that gender bias influences the language, content, and the length of letters of recommendation resulting in a greater preference for candidates who are men (Dutt, Pfaff, Bernstein, Dillard & Block, 2016; Madera, Hebl & Martin, 2009; Schmader, Whitehead & Wysocki, 2007; Trix & Psenka, 2003). One such study found descriptions of men applicants for a faculty position in a psychology department to be more agentic, or assertive, confident, and independent (Madera, Hebl & Martin, 2009). Recommendations for women applicants used more communal language such as descriptions of kindness, sensitivity, and nurturance (Madera, Hebl & Martin, 2009). Unfortunately, communal characteristics were found to have a negative relationship in the faculty hiring decisions (Madera, Hebl & Martin, 2009). Additionally, both

men and women hiring committee members are more likely to raise doubt about letters for women compared to men (Madera, Hebl, Dial, Martin & Valian, 2018). These findings suggest women are at a disadvantage relative to men in their applications for academic positions given the importance of letters of recommendation in the hiring and career advancement of a faculty member (Dutt et al., 2016; Madera et al., 2018). Although it is unclear how important letters of recommendation are during the hiring process for a CAO position, it is clear that they are influential in the early stages of a woman's academic career.

Research also demonstrates the intersectionality of gender and racial bias in academic hiring decisions. In an experiment conducted by Eaton and colleagues (2019), stereotypes about gender and race were examined by asking biology and physics professors (n = 251) from eight large, public, U.S. research universities to evaluate a curriculum vitae (vitae) for a post-doctoral position in their field. The candidate's name on the vitae was used to indicate race (Asian, Black, Latinx, and White) and gender (female or male), with all other aspects of the vitae remaining constant (Eaton, Saunders, Jacobson & West, 2019). Physics faculty rated Black women and Latinx women candidates the lowest in hireability compared to all others (Eaton et al., 2019). This study as well as prior research has found that women of color not only experience the bias patterns encountered by white women, but also report additional biased experiences not experienced by white women (Eaton et al., 2019; Williams & Dempsey, 2014). For example, Black women often have to display a higher level of competence than white men or women in order to be seen as equally competent (Kachchaf et al., 2015; Pittman, 2010; Williams & Dempsey, 2014), and Latinx women are often stereotyped as less competent and lower in STEM ability than white or Asian women (Blaine, 2013; Jimeno-Ingrum, Berdahl & Lucero-Wagoner, 2009). Consistent with these findings, women of color who are hired into faculty or senior

leadership positions in academia report experiencing even greater scrutiny than white women concerning their experience and credentials (Hannum, Muhly, Shockley-Zalabak & White, 2014; Turner, Myers & Creswell, 1999).

There have been a few studies that have interviewed search committees to determine what factors are considered during the evaluation of a candidate (Gasman, Kim & Nguyen, 2011; Wright & Vanderford, 2017). Such factors included the candidate's departmental fit, research area, potential research contributions, and ability to establish new techniques, indicating a strong preference for applicant's scientific research content and methods (Wright & Vanderford, 2017). However, the qualifications needed for full professor are likely not the same qualifications needed for CAO, so future research should attempt to explore the qualifications and hiring committee decisions of CAOs to fill this gap in the literature. This research study offers a glimpse of the education, experience, and qualifications held by the AAU CAOs. While this study does not provide concrete evidence of the qualifications necessary for the role, it does bring to light the most common, and likely valued, qualifications that CAOs of research universities possess.

The Benefits of Women in Leadership

The sources of differential career advancement among women faculty discussed in the previous section are important to consider because of the effects they have on women's representation in academic leadership. The benefits of diversity in leadership are widely documented in the business world. CloverPop, a decision-making database that tracked how 200 companies were making decisions along with the success of such decisions, found gender diverse teams make better decisions 73% of the time, and make decisions twice as fast as those that are not diverse (Cloverpop, 2017). McKinsey consulting company recently conducted a similar

study and found organizations with at least one female board member yielded higher returns on equity and higher net income growth than those that did not have any women on their board (Huber & O'Rourke, 2017). The presence of women in corporate leadership positions has also been linked to improved firm performance and increases in employee skill diversity and innovation (Dezsö & Ross, 2012; Nolan, Moran & Kotzscwar, 2016).

Scholars within the field of management have found similar results. Research by Raatikainen (2002) concluded that diverse groups make better decisions, which may lead to better performance of the organization. Diversity improves the knowledge base, the creativity and the quality of the decision making, and problem solving processes of a group (Erhardt, Werbel & Shrader, 2003; Watson, Kumar & Michaelsen, 1993). This is in part because diversity in a group yields diversity in perspectives on an issue which in turn results in better decision making. Women board members are especially adept at dealing with complex, strategic issues (Francoeur, Labelle & Sinclair-Desgagné, 2008). Universities are not immune to the challenges facing the business world. They too are faced with the need for greater revenue (in the form of tuition and grants), changing market needs (job training, research, credentials), and satisfying stakeholders (faculty, alumni, students). All of this falls within the purview of the chief academic officer. It is evident that a university has a lot to gain by hiring a woman CAO and diversifying its leadership.

Within higher education, having a woman in a position of leadership has positive effects on faculty searches and hiring decisions. A 2010 report by the National Research Council Committee found more women PhD's applied for faculty positions within science and engineering fields at major research universities when the chair of the faculty search committee was a woman. The authors concluded that having a woman lead the search committee signaled

that the department was committed to increasing the representation of women and providing leadership opportunities for female colleagues (National Resource Council, 2010). In a related study of departmental leadership, Langan (2019) found having a women department chair reduced the gender gap in research publications, pay, and tenure among assistant professors in economics, sociology, accounting, and political science across nearly 200 institutions.

Improving women's representation among the faculty is also critical to student learning. Women faculty and women faculty of color are more likely to practice student-centered pedagogy in the classroom (Hurtado et al., 2011) and directly interact with students (Umbach, 2006). The results of The Faculty Survey of Student Engagement, a national study utilized across institution types, indicate women are more likely than men to value and use effective educational practices that enhance student learning (Kuh et al., 2004). Similarly, a study using three national faculty databases found women faculty and faculty of color have a higher likelihood of using active learning techniques in the classroom (Milem, 2001). According to Trower and Chait (2002), the most accurate predictor of women undergraduate academic success is the percentage of women among the faculty. Women faculty members have the potential to increase student interest in a subject as indicated by course selection and major choice (Trower & Chait, 2002). This is especially true in mathematics and statistics, geology, sociology, and journalism (Bettinger & Long, 2005). Having a woman teach in a male-dominated field provides women students with role models and a greater sense of belonging (Bettinger & Long, 2005). A similar study at a selective science and technology focused institution conducted by Carrell and colleagues (2010) found women professors had a powerful effect on women students' performance in math and science classes, their likelihood of taking future math and science courses, and their likelihood of graduating with a STEM degree. Given that the majority of AAU

CAOs have STEM or engineering backgrounds, increasing the number of women students and faculty in the sciences is an important step in increasing women's representation in academic leadership.

Colleges and universities with women presidents and chief academic officers, as well as a greater percentage of women on their boards of trustees, experience larger increases in the growth of women faculty compared to institutions without a gender-diverse leadership (Ehrenberg et al., 2009). College and university boards with at least five women on it has a statistically significant effect on the number of women faculty employed at the institution (Ehrenberg et al., 2009). Furthermore, having a woman CAO also has a statistically significant effect on the year over year growth of women faculty (Ehrenberg et al., 2009). Thus, having women in these top leadership positions can have substantially positive effects on the make-up of the faculty, which in turn, directly affects student learning outcomes, retention, and the career choices of students as evidenced above. Given these findings, increasing women's representation in the top leadership positions should be a focus for colleges and universities.

Research on Chief Academic Officers

Much of the research on the role of CAO is concentrated within one institutional type-community colleges (Amey, VanDerLinden & Brown, 2002; Amey & VanDerLinden, 2002; Cejda, 2008; Cejda & McKenney, 2008; Fons, 2004; Keim & Murray, 2008). This is likely because community colleges are where women have been able to build successful academic careers and achieve equity with men in terms of representation (Martin & O'Meara, 2017). While there is very little empirical research on chief academic officers beyond community colleges (Keim & Murray, 2008), the few studies that do exist provide a snapshot of the current

profile of the AAU CAOs and offer a glimpse into the career pathways of women and men CAOs.

Every four years the American Council on Education (ACE) conducts a census of chief academic officers across institution types. While the data from the census survey are not made publicly available, the ACE Center for Policy Research and Strategy recently released a series of infographics highlighting the background, job duties, and professional pathways of CAOs. Results of the survey revealed that the majority of CAOs are white, with men outnumbering women in the role of CAO at four-year institutions; especially doctorate granting institutions where just 26.1% of CAOs are women (ACE, 2017; Johnson, 2017). The data also suggest gender differences in the career pathways of men and women CAOs. Women CAOs are less likely than men to serve multiple institutions on their pathway to becoming CAO, and typically hold the role of CAO at another institution before stepping into the role at their current institution (Johnson, 2017). Men CAOs on the other hand were more likely than women to have previously served as a dean at the institution prior to becoming CAO (Johnson, 2017). The position of CAO also continues to be a stepping stone to the college presidency, with about one-third of the CAOs indicating presidential aspirations (ACE, 2017). Interestingly, CAOs of color are slightly more likely to aspire to the presidency than white CAOs (ACE, 2017).

In another study conducted by Kelly (2011), the career pathways and career aspirations of 12 women chief academic officers across institution types was examined using a phenomenological approach. Kelly (2011) found the key facilitators of the career development of the women CAOs in his study to be academic background, diverse professional experiences, mentors, and the use of an executive coach. Interestingly, many of the women CAOs in this study discussed a lack of purposefulness in their career progression and did not aspire to become

a CAO when they started their careers in academia. However, two of the women in the study were deliberate in their career development, and actively strategized ways to minimize potential impediments and to acquire the professional experiences needed to advance to CAO.

Most recently, June and Bauman (2019) conducted a descriptive study of 201 CAOs at the 63 AAU institutions spanning from 2008 to 2019. Using 10 years of directory information from the Higher Education Directory, June and Bauman (2019) compiled a list of the most recent AAU CAOs and collected publicly accessible information found online to build a database of demographic information including race, gender, degree type, years of experience in the role, prior title and institution of employment, and position assumed after serving as an AAU CAO, when applicable. The data revealed that 75% of the current AAU CAOs are white men and 50% of all AAU CAOs from 2008 to 2019, held a Ph.D. in a STEM field (June & Bauman, 2019). 89% of the CAOs earned their PhD from an AAU institution, and 12% were appointed to the role at the institution where they were a graduate student (June & Bauman, 2019). This finding signals a potential network and source of social capital that graduates of the different AAU institutions are privy to and may access during the job search and hiring process. The authors also found that over half of the AAU CAOs held the title of dean prior to becoming CAO of an AAU institution, and almost two-thirds of the sitting CAOs were hired from within the institution rather than from another college or university (June & Bauman, 2019).

The existing research on chief academic officers provides a snapshot of the current profile of the AAU CAOs. However, further insight is needed to identify key forms of human capital, cultural capital, and social capital among the AAU CAOs in order to demystify the background and experience necessary for the role. In addition, we know men and women tend to take different career paths on their way to becoming CAO, but other gender differences related to

career advancement are unknown. For instance, are there key forms capital that many of the AAU CAOs possess? Is one gender more likely to possess these key forms of capital compared to the other? This research study examines each of these questions in depth.

Theoretical Framework

Three inter-related theories guided this research study: (1) human capital, (2) cultural capital, and (3) social capital. Each theory and its related concepts are introduced in relation to the focus of this research study, and are used to formulate the hypotheses tested and methods employed in the following chapters.

Human Capital

Human capital theory arose from the field of economics. The theory of human capital is used to explain returns on investment in one's self. Personal investment in education, training, work experience, and other knowledge and skills are forms of human capital. As people accumulate knowledge and skills over time such as education, training, and work experience, their productivity, efficiency, and earnings increase as a result (Becker, 1993; Olaniyan & Okemakinde, 2008). In addition to greater productivity and higher earnings, increased investment in human capital also results in greater career advancement and success (Adler & Izraeli, 1994; Metz & Thoarenou, 2001; Naff, 1994; Tharenou, 2001).

According to human capital theory, an individual's career progression and success is contingent upon the quantity and quality of their human capital (Ballout, 2007; Becker, 1993). Furthermore, studies of human capital find the accumulation of different forms of human capital (e.g., education, experience, and training) make employees more productive, and result in greater returns and rewards such as promotions and pay increases (Becker, 1993; Tharenou, 1997). Critics of human capital theory argue that education, a form of human capital, does not result in

greater productivity or efficiency, but instead serves as a signal to the employer that the individual is qualified for higher paying jobs (Strober, 1990). However, proponents of human capital theory assert that while education can signal to employers is that an individual is prepared for a job because they have the necessary education or training for the role, is not typically used as a signal for a promotion or pay increase. Rather, training and years of experience within the organization signal when a person is ready for promotion (Tharenou, Latimer & Conroy, 1994; Tharenou, 1997).

However, the literature on human capital theory has mixed findings on the importance of human capital at different levels of management. A global study of women managers in 21 countries found women's education credentials gave them access to lower levels of management, but women's lack of social networks prevented them from advancing to higher levels of management (Adler & Izraeli, 1994). In contrast, Metz and Thoarenou (2001) found several forms of human capital including type of occupation, years of work experience, trainings and personal development, career breakthroughs, and work hours were related to women's advancement at both low and high levels of management. Tharenou (1997) on the other hand, asserts that from middle management onwards, candidates with similar demographic characteristics and human capital as the existing management are more likely to be promoted into higher managerial positions than candidates with less similar attributes. Unfortunately for women and underrepresented minorities, white men tend to occupy management positions or other positions of power within many fields including higher education. As a result, white men may be more likely to be considered for promotion and other career opportunities.

Within higher education, much research has been conducted on the relationship between human capital and gender differences in faculty salaries (Bellas, 1994, 1997; Perna, 2001; Porter,

Toutkoushian & Moore, 2008; Smart, 1991; Toutkoushian, 2002; Umbach, 2007, 2008). The findings of this body of research suggest gender differences are largely caused by market and field segmentation. That is, women faculty tend to be concentrated in fields where the pay is lower (Melguizo & Strober, 2007), and in disciplines with high proportions of women faculty. Disciplines with high proportions of women faculty have lower earning potential compared to disciplines with high proportions of men faculty (Bellas, 1994, 1997; Umbach, 2007). Women also tend to work in institutions with lower prestige and spend more time on work roles that are not rewarded (Smart, 1991).

Higher education studies have also examined "unexplained wage gaps", or differences in faculty compensation, when aspects of human capital are controlled for including educational attainment, faculty rank, research productivity, experience level, and academic discipline (Perna, 2001, 2003; Porter, Toutkoushian & Moore, 2008; Toutkoushian, 2002; Toutkoushian & Conley, 2005). Using National Study of Postsecondary Faculty survey data across multiple years, Porter and colleagues (2008) employed hierarchical linear modeling to examine changes in pay differences over time. The authors found that the average starting salaries of men faculty were higher than women faculty, and that the total wage gap can be attributed to human capital, institutional, and discipline-related differences between recently-hired men and women faculty (Porter, Toutkoushian & Moore, 2008). Porter and colleagues (2008) also found a larger unexplained wage gap among senior men and women faculty, which the authors posit is due to a combination of unequal treatment over the course of their academic careers and significant differences in starting salaries of men faculty compared to women faculty (Porter, Toutkoushian & Moore, 2008). However, even when human capital and disciplinary characteristics were accounted for, the authors found recently-hired female faculty at research universities received

salaries that were 9% less than their male counterparts (Porter, Toutkoushian & Moore, 2008).

These findings suggest that despite having similar human capital, women faculty at research

universities are paid less than men faculty of the same rank and tenure. While the present

research study does not examine the faculty pay gap, it does apply the findings of Porter and

colleagues (2008) to the AAU CAOs by identifying specific forms of human capital that are

consistent among them, and thus are likely needed to advance to the role of CAO.

This research study extends the use of human capital theory to the study of chief

academic officers by identifying key forms of human capital such as education, background, and

experience that are consistent among the CAOs of the institutions in the AAU. I specifically

examined the role of human capital through the following measures: *prior experience, academic*

career, academic background, and *hire type*. Each of these variables have been employed by

other higher education researchers and social scientists as measures of human capital (Perna,

2003; Toutkoushian, 2002, 2003; Umbach, 2007, 2008), and can be considered reliable

measures. However, this research study builds upon the existing literature by measuring these

forms of human capital as they relate to the path to the CAO position at an AAU institution and

women's underrepresentation in this role.

Prior Experience. Previous research indicates women CAOs typically hold the role of

CAO at another institution before stepping into the role an institution of greater prestige (ACE,

2016; Johnson, 2017). Men CAOs on the other hand are more likely than women to have

previously served as a dean of an academic unit prior to becoming CAO (Johnson, 2017). Thus,

men and women tend to have slightly different prior experiences leading to their appointment as

CAO. However, such research has not yet been conducted on CAOs at research universities

specifically. As a result, this study examined prior position and time in position to determine whether any gender differences exist in previous experience through the following hypothesis:

H₁   *Men and women CAOs will have different prior experiences before their appointment as CAO of an AAU institution*

Academic Career. The most common career pathway to CAO is through the faculty ranks. However, women tend to have differential rates of tenure and promotion and are underrepresented at the rank of full professor at research universities in particular (Johnson, 2017; Misra et al., 2011; Niemeier & Gonzalez, 2004; U.S. Department of Education, 2016; West & Curtis, 2006). If women are taking longer to reach the rank of full professor, they are likely to have longer academic careers before their appointment to CAO. Given that the existing research also finds women are less likely than men to achieve tenure (Johnson, 2017; NCES, 2017; Leggon, 2001; Nelson & Rogers, 2003; Trower & Chait, 2002), it is possible women move into academic administration without achieving tenure. Thus, the present research study contributes to the literature by determining whether tenure is a necessary qualification for the CAO position at an AAU institution. Tenure status and time in academic career were examined through the following hypothesis:

H₂   *The majority of AAU CAOs will be tenured faculty however, women will have longer academic careers before appointment to the role of CAO at an AAU institution compared to men AAU CAOs*

Academic Background. Existing research on AAU CAOs reveals that 50% of all AAU CAOs from 2008 to 2019 held a Ph.D. in a STEM field (June & Bauman, 2019). However, it is well documented in the literature that women are under-represented in the STEM fields (Bonham & Stefan, 2016; Glass & Minnotte, 2010; Li & Koedel, 2017). As stated previously, women are leaking out of the academic pipeline, or are pushed out, in many STEM fields were male worker

norms make these fields unwelcoming and inhospitable to women. Women tend to be more highly concentrated in other fields such as education and the humanities (Knobloch-Westerwick, Glynn & Huge, 2013; Melguizo & Strober, 2007) suggesting women AAU CAOs are likely to have different academic backgrounds than the men AAU CAOs. This study examined whether such gender differences exist through the following hypothesis:

H3   *Women AAU CAOs will have different academic backgrounds in terms of discipline of terminal degree than men AAU CAOs; More men CAOs will have STEM backgrounds than women CAOs*

Hire Type. As stated previously, women CAOs are less likely than men to serve multiple institutions on their path to becoming CAO (Johnson, 2017). Women academic administrators are also more likely to be hired internally because they are more likely to serve at one institution throughout their career and be promoted within that institution (Cejda & McKenney, 2000; Hartley & Godin, 2010). While two-thirds of the AAU CAOs were internal hires (June & Bauman, 2019), it is unclear whether this differs by gender. Given the shortage of tenured women faculty at research universities and bias within the academic hiring process, the preference for internal candidates may not hold true for women. Thus, hire type was examined through the following hypothesis to determine whether the majority of AAU CAOs are hired internally or externally, and if any gender differences exist:

H4   *More women AAU CAOs will be internal hires than men AAU CAOs*

Commonalities among the human capital of AAU CAOs can shed light on the education, background, and experience necessary for the role of CAO at a major research university. However, human capital is likely not the only form of capital that is important for an AAU CAO to possess. Other forms of capital, such as cultural capital, may be equally as important.

Cultural Capital

The theory of cultural capital came from the field of sociology. The father of cultural capital theory, Pierre Bourdieu, defined cultural capital as the cultural background, knowledge, experiences, disposition, and skills that are transmitted from one generation to the next (Bourdieu, 1986). Further articulated by Lamont and Lareau (1988), cultural capital is "widely shared, high status cultural signals (attitudes, formal knowledge, behaviors, goods, and credentials) used for social and cultural exclusion" (pg.156). In other words, it is privileged form of capital recognized by others as a high-status cultural signal or status marker. Such status markers are legitimized by symbolic power (Steinmetz, 2006). Symbolic power defines what forms and uses of capital are recognized as legitimate bases of social positions in a given society (Steinmetz, 2006). Reputation or prestige in the academic community is the highest marker of status (Becher & Trowler, 1989). Thus, prestige is a form of symbolic power that is related and converted to cultural capital (Grenfell & James, 1998).

A key aspect of prestige is the accumulation and transaction of indicators of esteem. These can be official, such as title, academic rank and salary or honorary, such as fellowships and keynote speeches (Coate & Kandiko Howson, 2016). The accumulation and transaction of indicators of esteem can function as a virtuous cycle; those with prestige are rewarded with more and more prestige as their esteem accumulates (Coate & Kandiko Howson, 2016). It can also lead to cycles of cumulative disadvantage, where those with less prestige have less to trade and achieve less with what they have (Coate & Kandiko Howson, 2016). Women in academia often have less indicators of esteem compared to men (Coate & Kandiko Howson, 2016), and thus may have greater difficulty acquiring indicators of esteem and prestige throughout their career. Indicators of esteem generate cultural capital, and the esteem of that capital can lead to both tangible and intangible rewards (Henrich & Gil-White, 2001).

Much of the existing research on the cultural capital within academia relates to prestige. This body of research focuses on specific aspects of prestige as it relates to both individuals and academic institutions. Prestige has been used to explain the effects of the academic caste system (Burris, 2004; Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013) and the prestige economy, or value system, that elevates certain academic institutions above others (Blackmore, 2015; Blackmore & Kandiko, 2011; Morrison, Rudd, Picciano & Nerad, 2011). Such research has also examined the impact of prestige on faculty hiring (Clauset, Arbesman & Larremore, 2015; Fowler, Grofman & Masuoka, 2007; Headworth & Freese, 2016; Oprisko, 2012), faculty salaries (Melguizo & Strober, 2007), research productivity and grant awards (Ali, Bhattacharyya & Olejniczak, 2010; Bland et al., 2005; Tötösy de Zepetnek & Jia, 2014), and academic departments (Rosinger, Taylor, Coco & Slaughter, 2016). Other research has focused on gender differences in the attainment of prestige within academia and in academic work (Coate & Kandiko Howson, 2016; Kandiko Howson, Coate & St Croix, 2018). In sum, this research tells us that different forms of cultural capital carry varying levels of prestige in academia; higher prestige in the form of cultural capital enables greater career success and opportunities to accrue more and more prestige in one's career.

Most of the research to date has focused on the effects of prestige on faculty careers rather than academic administrators. However, this literature offers relevant insights for the present research study. Specifically, the research on faculty placement and hiring informs us that institutions of similar status or prestige hire from one another (Coate & Kandiko Howson, 2016; Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013). Among academic disciplines, certain disciplines are considered higher in status than others which impacts future access to tangible and intangible rewards such as higher salaries, selection for awards, and greater social influence

(Blackmore & Kandiko, 2011). This body of work also suggests that the prestige of faculty generally increases throughout their career. As faculty accumulate forms of cultural capital over time such as research publications, impact upon the field, research grants, and scholarly awards, they generate greater prestige (Ali, Bhattacharyya & Olejniczak, 2010; Blackmore & Kandiko, 2011; Hirsch, 2005). Such forms of cultural capital are especially important in promotion decisions and can influence the trajectory of academic careers. Given this research, several forms of cultural capital were examined in this research study as it pertains to the CAOs of the AAU including *prestige of academic institutions, status of academic disciplines, research publications, h-index scores*, and *research grants.*

Academic Institutions. The cultural capital associated with the prestige of elite university membership is thought to be symbolic of a superior education, access to exclusive resources, and a predictor of future success (Melguizo & Strober, 2007). The prestige of an institution is determined by a widely accepted ranking system among academic institutions. Research universities with very high research activity such as R1 and AAU institutions, as well as old institutions with high selectivity such as the Ivy League, are often considered the most prestigious higher education institutions (Burris, 2004; West & Curtis, 2006; Yoder, 1991). Not only do these institutions attract talented students and faculty, but they also have greater access to resources like research facilities and research funding. Affiliation with prestigious institutions also impacts future employment opportunities. The prestige of the department and institution in which an academic received their PhD consistently ranks as the most important factor in determining the employment opportunities available to those entering the academic labor market (Burris, 2004; Oprisko, Dobbs & DiGrazia, 2013). Academics who secure employment in the more prestigious departments and institutions gain differential access to resources and rewards

that enhance their prospects for subsequent career recognition and success (Burris, 2004).

Faculty members in prestigious departments are expected to possess greater human and cultural

capital that is indicative of a successful future academic career (Burris, 2004).

The prestige of one's academic institution also likely effects hiring for administrative

positions like CAO. More prestigious institutions may be considered higher status forms of

cultural capital that can be leveraged during one's academic career. However, women tend to be

concentrated in less prestigious institution types (Perna, 2001; Ward & Wolf-Wendel, 2004) and

thus, formed the basis of the following hypotheses:

H$_5$ *Men AAU CAOs are more likely than women AAU CAOs to have graduated from*
       prestigious institutions as indicated by membership in the AAU, membership in the
       Ivy League, and R1 Carnegie classification

H$_6$ *Men AAU CAOs are more likely than women AAU CAOs to have previously*
       worked at a prestigious institution as indicated by membership in the AAU,
       membership in the Ivy League, and R1 Carnegie classification

Academic Disciplines. Academic disciplines also have varying levels of prestige in the

academic community with some considered higher in status than others. Biglan (1973)

developed a typology of academic disciplines that classified disciplines into different domains.

The present research study focuses on two of those domains: the Hard-Soft and the Pure-Applied

domains. "The terminology such as "hard" and "soft" have taken on a pejorative perspective in

popular culture, implying the level of rigor involved in these disciplines, rather than

paradigmatic consensus" (Gardner, 2013, p.3). Within academia, Hard knowledge disciplines are

regarded more highly than Soft disciplines, and Pure disciplines more highly than Applied

(Becher & Trowler, 2001, p.173). Hard disciplines have well-established research paradigms that

involve universal laws and theories, causal propositions, and generalizable findings (Biglan,

1973). Hard knowledge tends to carry high prestige as it is perceived to be intellectually demanding and attracts individuals of high ability (Becher & Trowler, 2001). Examples of Hard disciplines include the physical sciences and mathematics. Soft disciplines tend to have less consensus around what constitutes well-developed theory and universal laws, and research findings tend to be less causal and generalizable. As a result, Soft disciplines are often considered lower in status and include disciplines such as the humanities and education (Melguizo & Strober, 2007). According to MacMynowski (2007) deeply established norms that valorizes mathematics and physics as the objective scientific ideal and views other research, particularly the in social sciences, to be less rigorous and valid and thus have less power, authority, and status.

Pure disciplines are also considered higher in status because they extend knowledge for knowledge's sake, and thus are unencumbered by outside motivations or concerns. The physical sciences and mathematics also comprise the Pure dimension. Unlike Pure disciplines, Applied disciplines are regulated by external influence and examine more applied problems as a result of their professionalization (Biglan, 1973). Thus, Applied knowledge can be considered lower in status because of the susceptibility of its research agenda to dictation by non-academic interests (Becher & Trowler, 2001, p.179). Examples of Applied disciplines include engineering, accounting, and finance. However, some Applied fields such as engineering can accrue status through other means like grant funding. As a result, fields like engineering are considered higher in status than other Applied fields.

Women academics tend to be concentrated in lower status disciplines than men such as education and the humanities, while men tend to be more highly concentrated in higher status disciplines such as the physical sciences and mathematics (Knobloch-Westerwick, Glynn &

Huge, 2013; Melguizo & Strober, 2007). The status of one's discipline can have significant effects on opportunities to accrue indicators of esteem and prestige in one's career, which in turn can impact future career success. Structural theories of field segmentation assert that gender and race differences in employment outcomes such as tenure and rank are attributable to the segregation of women and minorities in academic disciplines that have lower prestige and value (Bayer and Astin, 1968; Smart, 1991; Bellas, 1997). In sum, the research presented informed the following hypothesis:

H₇ *Women AAU CAOs will be concentrated in "lower status" disciplines compared to men AAU CAOs as indicated by Biglan's (1973) typology of Hard-Soft and Pure-Applied disciplines*

Research Publications. Academic reputation is to a great extent, built upon scholarly research (Clemens et al., 1995; Keith & Babchuk, 1998). Faculty members increase their prestige by publishing articles and books, obtaining research grants and patents, and being elected to various national academies (Melguizo & Strober, 2007). At research intensive institutions, research is highly rewarded in the academic reward system (Aguirre, 2000; Bellas & Toutkoushian, 1999; Carrigan, Quinn & Riskin, 2011; Link, Swann & Bozeman, 2008). Promotion and advancement often rest on the scholarly output of the faculty member. The institution where a faculty member is employed also benefits from that prestige. When a faculty member publishes an article or book, the name of the institution where the author is employed is mentioned. Likewise, book reviews or articles in scholarly journals can also appear in popular press (Melguizo & Strober, 2007), thus bringing further recognition to the institution and increasing its prestige. In sum, more research publications means more prestige for that faculty member and their institution.

It is important to note that publication rates can differ by academic discipline. In a study by Melguizo and Strober (2007), faculty across several academic disciplines on average, published 22.3 articles in refereed journals over the course of their career. Faculty in science fields had an average lifetime publication rate of 35.3, while faculty in humanities and fine arts had an average lifetime publication rate of 11.8. Faculty in the social sciences tend to have publication rates closer to the arts and humanities than engineering or the natural sciences (Shin & Cummings, 2010). It is well documented in the literature that faculty in the STEM disciplines tend to have a greater number of publications, grants, and commitment to scholarly activities relative to faculty in other academic disciplines (Melguizo & Strober, 2007; Xu, 2012). Likewise, faculty in Hard disciplines, which includes many of the STEM disciplines, also tend to have higher publication rates than Soft disciplines like the arts and humanities (Shin & Cummings, 2010).

Research on faculty research productivity also indicates that men faculty, on average, publish more than women faculty (Brown & Samuels, 2018; Lone & Hussain, 2017; Strand & Bulik, 2018; Van den Besselaar & Sandström, 2017), including more single or first author research publications which are considered higher in status (Roverst & Verhoef, 2016). Differences in men and women's research productivity can be largely explained by the fact that women faculty tend to be concentrated in soft disciplines where publication rates are not as high, in non-research-intensive institutions, and as explained earlier in this chapter, often have less time to devote to research activities (Link, Swann & Bozeman, 2008; Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva & Nyunt, 2017). Unfortunately, a lack of cultural capital in the form of research publications, coupled with a tendency to spend more time on teaching and service, contributes to a cumulative cycle of disadvantage for women faculty (Coate & Kandiko

Howson, 2016). Given this research, I hypothesized women AAU CAOs would have a slightly

lower total number of research publications than men AAU CAOs:

H8 *Men AAU CAOs will have a greater number of research publications including more single-author and co-authored research publications than women AAU CAOs*

H-index. In general, when a researcher cites a research paper, it indicates that researcher

endorses the findings of that research paper as well as its authors (Zhou, Lü & Li, 2012).

Previous studies show that the number of citations is correlated with the quality of research

produced (Aksnes, 2006; Moed, 2005). Given this line of thinking, the number of citations a

researcher's publications have accrued signals the quality of their research outputs and can be

considered an indicator of prestige (Francesche, 2010). A common measure of a researcher's

citations is the h-index. The h-index was created by James Hirsch (2005) as a way to quantify the

cumulative impact and relevance of an individual's scientific research output. A high h-index is a

reliable indicator of research accomplishment, and is a useful way to compare the impact of

one's research productivity against other researchers as it combines the effects of quantity

(number of publications) and quality (number of citations) (Hirsch, 2005).

A faculty member's h-index score likely plays an important role when making decisions

about promotions, funding allocation, and achievement awards (Costas & Bordons, 2007;

Hirsch, 2005). The h-index is a more reliable measure than other measures used to evaluate the

scientific output of a researcher such as impact factor, total number of citations, citation per

paper rate, or number of highly cited papers (Alonso, Cabrerizo, Herrera-Viedma & Herrera,

2009). The h-index does have some limitations. First, all citations are considered equal and as a

result, self-citations could increase one's h-index score (Bornmann & Daniel, 2007). However, a

study by Cronin and Meho (2006) found the elimination of self-citations did not have a

significant impact on researchers' h-index score. Second, there are disciplinary differences in typical h-index scores due to differences in publication rates and citation practices. As a result, it is recommended that the h-index not be used to compare researchers from different disciplines (Hirsch, 2005). Lastly, the h-index is based on a researcher's lifetime citations. While this incorporates productivity as well as citation impact into one metric, it is highly dependent upon the length of the researcher's academic career. That is, h-index scores increase over time (Bornmann & Marx, 2011). Cronin and Meho (2006) suggest that the h-index can be used to "express the broad impact of a scholar's research output over time" (p. 1275) and thus can be used for comparing researchers of similar age or career stage.

Despite these limitations, the h-index is still considered a reliable indicator of research productivity, impact, and the prestige of a researcher. Given that men tend to have a greater number of research publications and are more highly concentrated in Hard disciplines where research findings are more generalizable and thus may be cited by other researchers more often than those in other disciplines, I hypothesized:

H9   *Men AAU CAOs will have higher h-index score than women AAU CAOs*

Research Grants. "Grantmanship is an art to be cultivated by the successful careerist: the earning of outside funds is a positive influence in the processes of professional recognition and advancement" (Becher & Trowler, 2001, pg.177). Research grants are another indicator of prestige among faculty, and are highly rewarded in the academic reward system and thus have a significant impact on career advancement. Because these funds are awarded to "excellent" projects that prevail in competitive processes (Stephan, 2012), research revenue in the form of grant awards confer both money and status to the individual and the institution (Rosinger, Taylor, Coco & Slaughter, 2016). For the individual faculty member, securing competitive

61

research grants enhances reputation (Ali, Bhattacharyya & Olejniczak, 2010). Research grants also signals future research output and may result in other financial rewards such as an increased salary for that faculty member (Melguizo & Strober, 2007). When a faculty member obtains a research grant and becomes a principal investigator (PI), the grant is generally announced to the academic community thus accruing prestige for both the faculty member and the institution (Melguizo & Strober, 2007). At research universities in particular, grant awards are highly valued because of the prestige and revenue they bring into the university to pay for its research mission (Callier, Singiser & Vanderford, 2015). Increased prestige through research also attracts top academics and gifted students, and brings future grant awards to the institution (Callier, Singiser & Vanderford, 2015).

The likelihood of obtaining research grants is part of a feedback cycle, whereby a strong record of scholarly publication and an affiliation with a prestigious research institution improves one's ability to obtain research funding. As the number of publications and citations increases, the number of grants obtained also increases- more productive faculty members have a higher probability of securing research grants. Previous success obtaining research funding increases the likelihood of securing future grant awards which in turn enhances one's ability to publish and obtain greater individual and institution prestige (Liebert, 1977). Membership in the AAU also has a significant influence on the number of and dollar amount of research grants (Ali, Bhattacharyya & Olejniczak, 2010). Thus, the prestige of an academic institution, research productivity, and grant awards are all related. Faculty at prestigious research institutions are both more likely to publish and secure grant funding than faculty at less prestigious institutions which in turn, increases the prestige of the individual faculty member and the institution.

Grant funding is more abundant in certain academic fields than others. Approximately 97% of federal research and development funding is directed toward science and engineering fields (National Science Board, 2014). Faculty in the biological and biomedical sciences and faculty in physical and mathematical sciences are more likely to secure grants carrying a higher dollar value compared to faculty in engineering and the social sciences. Unfortunately, women tend to be concentrated in academic disciplines where grant funding is not as abundant as it is in the STEM fields, or more applied fields like engineering or economics (Melguizo & Strober, 2007; Rosinger, Taylor, Coco & Slaughter, 2016). Such field segmentation, coupled with the tendency for men to spend more time on research activities like applying for research grants (Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva & Nyunt, 2017), can negatively impact women faculty's ability to secure research funding in the form of grant awards. Furthermore, gender bias among grant applications tends to favor men in that men are more likely than women to be awarded grant awards (Lerback and Hanson 2017; Magua et al., 2017; Sheridan et al., 2017; Witteman, Hendricks, Straus & Tannenbaum, 2019).

External funding is used at the individual level as a criterion in academic job decisions; for tenure track faculty positions, applicants often must list the grants they have been awarded. The source of the grant is also often taken into consideration, with highly competitive grants from funding sources with a rigorous peer review system (e.g. grants from the National Science Foundation) are weighted more heavily than grants from other sources (Freeman & DiRamio, 2016). As a result, evidence of managing large research grants may be a key form of cultural capital for an AAU CAO. However, field segmentation, differential time for research, and bias in the awards process suggest it is more difficult for women to secure prestigious research grants.

As such, gender differences in total number of and dollar amount of research grants awarded to the AAU CAOs was examined in this research study through the following hypothesis:

H$_{10}$ *Men AAU CAOs will have greater total number of research grants and a greater mean total dollar amount of research grants than women AAU CAOs*

In summary, universities facilitate the exchange of different kinds of capital and are major dispenser of cultural capital (Delanty, 2001). Cultural capital is directly related to prestige, and greater prestige creates greater opportunity for career success. When cultural capital is combined with the social capital of belonging to an elite network of researchers, it can be converted into tangible and intangible rewards (Henrich & Gil-White, 2001) such as future employment opportunities, increased likelihood of securing research grants, and ability to attract other talented faculty and students to the institution (Mendoza, Kuntz & Berger, 2012). Thus, the final form of capital examined in this research study is social capital.

Social Capital

Pierre Bourdieu also developed the modern theory of social capital. At almost the same time, James Coleman developed a similar theory of social capital based upon a rationale choice model (Häuberer, 2011). However, this research study uses Bourdieu (1986)'s theory of social capital as the theoretical framework. In social capital is defined as "the ability of actors to secure benefits by virtue of membership in social networks or other social structures" (Portes, 1998, p. 6). These benefits are often scarce resources that can be accessed and mobilized through relationships within social and professional networks and affiliation with, or membership in, professional organizations (Metz & Thoarenou, 2001). These types of social ties can also build other forms of social capital by providing access to other resources such as information, influence, and career sponsorship (Christakis & Fowler, 2009; Ibarra & Deshpande, 2004; Ibarra et al., 2005; Lin, 1999; Niehaus & O'Meara, 2015; Seibert et al., 2001). Like cultural capital,

social capital is exclusionary and can reproduce social inequality. Social capital is not distributed evenly among individuals and thus results in differential power and status among individuals. Individuals who are a part of more exclusive social structures or networks have greater power and status than those individuals who are not affiliated with the social structure or network.

Studies within the field of management have found social capital is important for women's advancement at all levels of management (Adler & Izraeli, 1994; Ibarra, 1997; Metz & Tharenou, 2001; Tharenou, Latimer & Conroy, 1994). Empirical evidence indicates that being part of social networks (Adler & Izraeli, 1994; Ibarra, 1997) and obtaining career encouragement and sponsorship from colleagues and superiors (Tharenou, Latimer & Conroy, 1994), help women advance in management, including to executive levels (Metz & Thoarenou, 2001). Using a survey of women members of the Australian Institute of Banking and Finance, Metz and Thoarenou (2001) examined women's advancement by managerial level. The authors found that women report social capital factors as either facilitators or barriers to advancement more frequently at high managerial levels than at low managerial levels. Lack of knowledge and skills were reported as barriers to advancement more by women at junior and middle manager levels than at supervisor and senior manager levels (Metz & Thoarenou, 2001). For women at higher levels of management, their immediate supervisor and gender stereotypes were among the most frequently cited barriers to advancement, while mentor support was a key facilitator (Metz & Thoarenou, 2001).

Within higher education, the effects of social capital and professional networks (a type of social capital) have been examined in relation to faculty hiring and career sponsorship (DiRamio, Theroux & Guarino, 2009; Godechot & Mariot, 2004). Within the field of political science, PhD graduates' benefit from the social capital of their advisor and that of their PhD committee. The

reputation of their advisor and dissertation committee members was positively associated with obtaining a tenure track faculty position (Godechot & Mariot, 2004). A similar study by Combes (2008) found the presence of one's PhD advisor on the hiring committee for a faculty position has a strong positive impact, equivalent to five additional research publications, on the hiring decision of the committee. According to Godechot (2014), the opinion of an applicant's PhD advisor or committee are usually solicited by the rest of the hiring committee, since such contacts are likely to have additional information about that applicant. This additional knowledge of the applicant can work in the applicant's favor. Godechot (2014) found early career success of an applicant is often more related to the advisor's productivity and prestige than that of the applicant. Thus, the eminence or reputation of one's academic advisor can extend to the advisee and can result in favorable employment outcomes/ opportunities.

Social capital can also be accrued though affiliation with elite academic programs and institutions. Elite academic programs tend to hire graduates of other elite programs (Coate & Kandiko Howson, 2016; Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013). This tendency has been observed across almost all academic disciplines (Fabrianic, 2011). Bedeian and colleagues (2010) found that the status and prestige of doctoral programs in business management have a significant effect on graduate hiring. Within the field of information studies, institutional prestige was found to be weighted heavier than program prestige when judging the quality of a graduate's educational background (Wiggins, 2007). The eminence or prestige of a university creates a "halo effect" that bolsters the status of programs that are located within prestigious universities (Burris, 2004). In the field of higher education administration, research has shown that graduate programs that are perceived as prestigious by their academic peers are more likely to hire individuals from other top programs (DiRamio et al., 2009). The study by DiRamio and

colleagues (2009) examined the social network of top-ranked higher education administration programs. The authors analyzed three variables: (a) current institution, (b) previous institution, and (c) institution where the doctorate was earned for 200 faculty members at top-ranked US. News and World Report institutions. Almost 20% held a doctorate from the institution where they were employed, and 70% earned their doctorate from another top-ranked institution (DiRamio, Theroux & Guarino, 2009).

Freeman and DiRamio (2016) extended this study to ascertain why top programs in higher education administration prefer to hire faculty members from other top programs. Earlier research suggests colleges and universities attempt to increase research productivity at their institutions by hiring graduates of top-ranked, prestigious graduate schools, which have the reputation of being highly productive (Creswell, 1985). However, over time the productivity of the new faculty dropped to the level of the older faculty rather than significantly improving research productivity among all faculty (Creswell, 1985). Freeman and DiRamio (2016) identified several other reasons prestigious institutions hire from on another: structural, research, prestige and externalities. Chief among these reasons is to maintain the brand identity of a top-ranked institution. Search committees generally want to hire individuals who come from institutions which have identities comparable to or stronger than their own (Freeman & DiRamio, 2016).

The present research study expands the research on the influence of social capital among CAOs. I specifically examined the role of social capital through the following measures: *Academic institution affiliations* and *Professional organization affiliations*.

Academic Institution Affiliations. Affiliations with prestigious academic institutions likely influences future employment at an AAU institution. Graduates of prestigious universities

enjoy a significant professional benefit from their access to a network-based system of affiliation that will allow them to succeed because they are better situated than peers from less-prestigious programs (Oprisko, Dobbs & DiGrazia, 2013). The brand and reputation of a graduate's institution signals to a search committee that the candidate likely has access to an influential network and has been trained to publish in top tier journals and journals of high impact (Freeman & DiRamio, 2016). Academics who secure employment in the more prestigious departments and institutions gain differential access to resources and rewards that enhance their prospects for subsequent career recognition and success (Burris, 2004). In addition, search committees and hiring committees often use their alma mater, or other academic affiliations, as a tool to weed out other candidates for consideration (Oprisko, Dobbs & DiGrazia, 2013). The prestige hierarchy in academia often elevates "affiliated honor", or excellence granted based upon membership in prestigious groups such as academic institutions or professional organizations, during hiring decisions (Oprisko, 2012). Thus, affiliation with prestigious academic institutions have significant career benefits for the individual. It also follows that multiple affiliations with prestigious institutions will have greater career benefits. The greater the number of different academic affiliations an individual has, the greater the number of potential opportunities the individual could be afforded access to. Thus, having a prestigious academic pedigree, especially one with multiple AAU institution affiliations is likely an important form of social capital for a future AAU CAO to possess. This research formed the basis for the following hypothesis:

H_{11} *The AAU CAOs will have multiple academic institution affiliations, and there will be common affiliations among them*

Professional Organization Affiliations. Membership in voluntary organizations or professional associations has also been used as a measure of social capital by researchers such as Stoloff and colleagues (1999). Membership in an organization has the capability of increasing

new information and connections (Stoloff et al., 1999). Multiple affiliations results in greater social capital in terms of more network connections and broader interactions with individuals in and across networks (Wollebaek & Selle, 2002). This in turn generates access to different forms of social capital like information, resources, and opportunities.

The intensity of an individual's participation in voluntary organizations or professional associations is not necessarily associated with greater returns. That is, intense contact with members and frequent participation in the organization does not have a significant impact on the size or growth of one's network (Wollebaek & Selle, 2002). Instead, research suggests weaker or more passive membership results in broader networks and more affiliations (Wollebaek & Selle, 2002). Wollebaek and Selle (2002) examined participation in voluntary associations and professional networks using a national survey of Norwegians aged 16 to 85. Using cross-tabulations and regression analyses, the authors found for each new affiliation, the professional networks of an individual are extended, and the probability of the presence of new connections increases sharply until the third-degree of affiliation. In concert with these findings, I do not explore the level of involvement AAU CAOs have in their professional association memberships, but rather measure the number of professional organizations they are affiliated with. Commonalities among the AAU CAO's professional organization affiliations could also indicate a potential professional network that has been influential in achieving the position of CAO.

To examine professional organization affiliations among the AAU CAOS, and any commonalities in membership, the following hypothesis was tested:

H$_{12}$ *The AAU CAOs will have membership in multiple professional organizations, and there will be common affiliations among them*

Conclusion

This review of the literature examined past studies on chief academic officers and served as a guiding framework and foundation for this research study. Because very little research has been conducted on the backgrounds and experiences, indicators of prestige, and affiliations of chief academic officers at research universities, there was a limited body of work in which to critique and to ground this study. However, I was able to draw from the broader literature on faculty careers given the depth of this literature base and its relevance to the topic under study. Given that the majority of CAOs come from the faculty (75%), a significant proportion of their academic careers can be explained or represented by this literature (June & Bauman, 2019). This literature base enabled me to identify factors contributing to the differential career advancement and underrepresentation of women in academia. Specifically, pipeline issues and lack of critical mass were discussed in relation to their negative impacts on the retainment of women faculty. Gender differences in work-life balance and inequities in workload were presented as explanations for cycles of cumulative disadvantage women faculty face throughout their academic careers. Structural constraints and foggy climates were also discussed in terms of their negative effects on the career advancement of women faculty and academic administrators. Finally, gender bias in the hiring process was discussed as a contributing factor to the underrepresentation of women faculty and administrators in research universities. In sum, the literature on faculty careers enabled me identify ways in which this research study can contribute to the field of higher education.

In this review of the literature I also introduced three inter-related theories: human capital theory, cultural capital theory, and social capital theory. These three theories formed the basis of my theoretical framework and enabled me to formulate research questions and hypotheses to examine the backgrounds and experiences, indicators of prestige, and affiliations of the AAU

CAOs. In the next chapter I detail how I collected data on these key forms of capital and tested

the hypotheses introduced throughout this chapter. Insights into key forms of capital that may

have enabled the career advancement of the AAU CAOs is imperative to identifying sources of

women's underrepresentation in this role. Furthermore, such insight can provide strategic

guidance to women aspiring to the role of CAO at an AAU institution by identifying distinct

forms of capital that they can obtain to better prepare themselves for the job search and hiring

process. In doing so, women's representation within the leadership of the elite research

universities may begin to improve.

Chapter Three

In this chapter I describe the methods used to conduct this research study. I begin by outlining the purpose of this study and my research questions. I then explain my positionality as a researcher and how that influenced my research design. I then discuss my research design including how I selected the sample, my data collection approach, and the methods I utilized to analyze the data. I conclude this chapter by describing how I ensured the trustworthiness of my data and findings and discuss potential limitations of this research study.

Purpose and Research Questions

Given the underrepresentation of women CAOs at the elite research universities, there is a need to better understand the credentials, backgrounds, and experiences (measures of human capital), indicators of prestige (measures of cultural capital), and professional affiliations (measures of social capital) of the men and women AAU CAOs. Such examination can illuminate gender differences that may be contributing to women's underrepresentation in the role of CAO at the AAU institutions. Therefore, the purpose of this study was twofold: (1) Identify key forms of human capital, cultural capital, and social capital among CAOs at the 63 research universities within the AAU, and (2) Examine if there are gender differences in accumulated forms of capital among the AAU CAOs.

The following three research questions, and twelve hypotheses informed by the existing literature reviewed in the previous chapter guided this research study (see also, Appendix B):

Research Question 1: What are key forms of human capital accumulated by CAOs of AAU institutions from 2008 to June 2020? 1a). What gender differences, if any, exist in the human capital of the CAOs of the AAU institutions?

> H_1 *Men and women CAOs will have different prior experiences before their appointment as CAO of an AAU institution*

H₂ 	*The majority of AAU CAOs will be tenured faculty however, women will have longer academic careers before appointment to the role of CAO at an AAU institution compared to men AAU CAOs*

H₃ 	*Women AAU CAOs will have different academic backgrounds in terms of discipline of terminal degree than men AAU CAOs; More men AAU CAOs will have STEM backgrounds than women AAU CAOs*

H₄ 	*More women AAU CAOs will be internal hires than men AAU CAOs*

Research Question 2: What are key forms of cultural capital accumulated by CAOs of the AAU institutions from 2008 to June 2020? 2a). What gender differences, if any, exist in the cultural capital of the CAOs of the AAU institutions?

H₅ 	*Men AAU CAOs are more likely than women AAU CAOs to have graduated from prestigious institutions as indicated by membership in the AAU, membership in the Ivy League, and R1 Carnegie classification*

H₆ 	*Men AAU CAOs are more likely than women AAU CAOs to have previously worked at a prestigious institution as indicated by membership in the AAU, membership in the Ivy League, and R1 Carnegie classification*

H₇ 	*Women AAU CAOs will be concentrated in "lower status" disciplines compared to men AAU CAOs as indicated by Biglan's (1973) typology of Hard-Soft and Pure-Applied disciplines*

H₈ 	*Men AAU CAOs will have a greater number of research publications including more single-author and co-authored research publications than women AAU CAOs*

H₉ 	*Men AAU CAOs will have higher h-index score than women AAU CAOs*

H₁₀ 	*Men AAU CAOs will have greater total number of research grants and a greater mean total dollar amount of research grants than women AAU CAOs*

Research Question 3: What are key forms of social capital accumulated by CAOs of AAU institutions from 2008 to June 2020? Do any common professional affiliations emerge among the AAU CAOs in this study?

H_{11} *The AAU CAOs will have multiple academic institution affiliations, and there will be common affiliations among them*

H_{12} *The AAU CAOs will have membership in multiple professional organizations, and there will be common professional organization affiliations among them*

These research questions and hypotheses enabled me to identify common forms of capital among the AAU CAOs from 2008 to June 2020, as well as gender differences that exist. Identifying similarities and differences in the various forms of human capital, cultural capital, and social capital held by the men and women AAU CAOs is important to understand because of the implications for women's representation and full participation in this role in the future. In the sections that follow I present the findings of this research study and discuss the implications of these findings in the next chapter.

Positionality of the Researcher

I became interested in studying chief academic officers when I was an undergraduate student. One of my mentors was the CAO of the Pennsylvania State University. Aside from respecting his leadership ability, I found his role as the CAO fascinating. He was involved in every thread of the university, from academics to athletics, and spent much of his days in meetings crafting policy, reviewing budgets, overseeing tenure decisions and other faculty matters, or leading special taskforces and committees charged by the President, Board of Trustees, or Faculty Senate. I found myself wanting to be in this role myself and set a lofty career goal of one day becoming CAO of a research university. It wasn't until my graduate studies that I became aware of the many obstacles facing women who aspire to this career path,

which I have presented in detail in the previous chapters of this dissertation. As a woman pursuing a PhD in higher education and hoping to make a career in academia both as a faculty member and as an administrator, knowledge of these obstacles is discouraging. However, there are women who have persevered to achieve tenure and advance to the role of CAO at major research universities. The accomplishments of these women are encouraging to me and likely to other women with similar career aspirations. Unfortunately, little is known about the backgrounds and experiences, indicators of prestige, or the professional affiliations of these women CAOs. It was my goal to bring this information to light through this dissertation.

A large body of my research work has focused on gender differences in faculty workload, promotion and advancement, and feelings of satisfaction and agency in faculty careers (Lennartz & O'Meara, 2018; O'Meara et al., 2019; O'Meara, Jaeger, Misra, Lennartz & Kuvaeva, 2018). While I have not previously studied CAOs, the underrepresentation of tenured women faculty is directly related to the underrepresentation of women leaders in the academy, given that tenure often serves a steppingstone, or pre-requisite, for academic administration. As such, my research background and interest in the role of CAO provides me with a deep knowledge of the literature base, and a critical lens to study the career pathways of women CAOs and the ways in which they differ from men CAOs. It is also important to acknowledge that while my research has not focused on racial differences in faculty workload, promotion and advancement, and agency in faculty careers, such differences do exist and are important to study. Thus, this dissertation introduced commonalities between white women faculty and women faculty of color generally, and the intersectionality of gender and race among women faculty of color. Consistent with the work of Ibarra (1993) I presented commonalities affecting the career advancement of white women faculty and women faculty of color in the previous chapters because both groups are

numerical minorities within academia, both groups are subject to negative stereotypes and evaluations of competence and fitness for leadership, and both groups share characteristics of lower status in terms of appointment types and disciplinary fields. Thus, it is important as a researcher to acknowledge the barriers to career advancement that faculty of color, and women faculty of color in particular also face on their path to the position of CAO.

As a researcher I also recognize there are many other identities and intersections of identity such as sexual orientation, ability, and nationality that this research study does not take into account. This is not to say that these other aspects of one's identity are not important, but given the method of data collection I employed and the focus of this study, I was not able to capture or analyze all aspects of an individual's identity. It is my hope that future research can build upon my work and examine other identities and intersections of identities in regard to the position of CAO at an AAU institution.

Research Design

This research study was designed to enable the study of different measures of human capital, cultural capital, and social capital among the AAU CAOs from 2008 to June 2020, and any gender differences that exist. Thus, my sample included individuals who held the position of CAO at an AAU institution between 2008 and June 2020 (conclusion of my data collection). To answer my research questions, I executed the data collection approach outlined in this section. Once this dataset was constructed, I utilized quantitative research methods in the form of descriptive statistics, t-tests, and chi square analyses to answer my research questions and test my hypotheses. I detail how these methods were used to analyze the data in the following sections as well.

Sample

The 230 CAOs of the AAU institutions from 2008 to June 2020 comprised the sample of

CAOs examined in this research study. The list of CAOs that met this criterion originated from a

list of directory information for acting and permanent CAO appointments. This list was retrieved

by June and Bauman (2019) from the Higher Education Directory organization and contained the

name and contact information for 212 AAU CAOs. June and Bauman (2019) verified this

directory data and collected additional demographic data on the gender, race, start date, and end

date (if applicable) of each CAO in the directory list using publicly available information found

online including institution biography pages, news releases, and vitaes which June and Bauman

very graciously shared with me. Each source used was recorded by June and Bauman (2019) in

the dataset. When June and Bauman (2019) discovered gaps or inconsistencies in the data, they

updated the data accordingly. Gender and race were recorded as binary variables (Male/Female;

White/Non-white) using references to gender and race in institution biography pages, news

releases, or photos available online.

To capture turnover and new appointments since June and Bauman (2019)'s study, I

expanded the dataset to include acting and permanent AAU CAOs appointed between January

2019 and June 2020 (n=18). Thus, the total sample of this research study was comprised of 230

CAOs appointed to the role at an AAU institution between 2008 and June 2020. It is worth

noting that some institutions are overrepresented in the sample due to higher turnover among its

CAOs between 2008 and June 2020. For instance, several public universities in the sample had 6

or more provosts in this time period (e.g., Purdue University and the University of Illinois)

whereas others had only two (e.g., Northwestern University and Iowa State University). Among

the Ivy League institutions, Cornell University had 5 CAOs while Harvard University and

Princeton University had only 2. However, the average number of CAOs per institution in this

time period was 3.8 and 3.4 among the Ivy League institutions. Despite the over-representation of some institutions within the sample due to higher turnover, I proceeded with examining the entire sample given that the focus of my research study was to identify key forms of capital among all CAOs recently appointed to the role at an AAU institution during this time period.

Data Collection

After establishing the sample for this research study, I built a more comprehensive dataset that included all AAU CAOs from 2008- June 2020 (n=230) and that enabled the examination of different measures of human capital, cultural capital, and social capital among the AAU CAOs. While the original dataset constructed by June and Bauman (2019) included demographic data and a few measures of human capital and cultural capital, I collected data on several other measures of human capital, cultural capital, and social capital to examine my research questions and took steps to verify the data previously collected by June and Bauman (2019).

I began by performing my own cross checks on the June and Bauman (2019) data by triangulating this data against my own online searches of the 212 AAU CAOs in the original dataset to return the most up to date institution websites, biographies, news releases, faculty webpages, and vitaes to verify the June and Bauman (2019) data against. To account for turnover since the original data was collected, I also conducted a search of each AAU institution to confirm the current CAO and added 18 newly appointed CAOs to my dataset. This step ensured that my dataset was complete as of June 2020 (n=230). Consistent with June and Bauman (2019)'s data collection approach, I collected gender as a binary variable (male/female) by referencing institution websites, biographies, news releases, and faculty webpages for mentions of the gender of the AAU CAOs appointed after January 2019 (n=18) and verified the gender

data collected by June and Bauman (2019) using this same approach (n=212). While some individuals in my dataset may not personally identify as male or female, no other pronouns were used in the institutional biographies and press releases referenced for each AAU CAO in my dataset. As a result, I utilized this binary construct of gender for subsequent analyses. Also consistent with June and Bauman (2019)'s data collection approach, I collected race/ethnicity as a binary variable (white/ nonwhite) by referencing institution websites, biographies, news releases, and faculty webpages for mentions of race/ethnicity, or by referencing pictures available online for the AAU CAOs appointed after January 2019 (n=18) and verified the race/ethnicity data collected by June and Bauman (2019) using this same approach (n=212). Like gender, this method of data collection is subject to the researcher's interpretation of another person's race/ ethnicity and may not be reflective of how a person identifies. In order to collect more accurate race/ethnicity data, I also requested the AAU CAOs in my dataset (n=230) to self-identify their gender and race/ ethnicity via email or google form (See Appendix A). Unfortunately, due to a low response rate among my total sample (11%, n=230) I was not able to further verify the race/ethnicity data collected by myself or June and Bauman (2019). As a result, I only present descriptive statistics on race/ethnicity data in the following chapters to prevent potentially misleading or inaccurate findings and conclusions that could result from further analysis of the race/ethnicity data collected. Finally, I collected data on the different measures of human capital, cultural capital, and social capital I examined in this research study using publicly available sources including institution websites, biographies, news releases, faculty webpages, and vitaes. I expand upon the steps I took to collect this data in the sections that follow and provide a complete list of the data collected in Appendix B.

Demographics. The following demographic data was collected for the total sample of

AAU CAOs examined in this research study: name of CAO, email, gender, race, start date, and

end date (if applicable). The name and email address of each AAU CAO in my dataset was

collected from directory information located on the AAU institution websites (n=230). Start date

and end date were collected from publicly available sources online including institution websites,

biographies, and news releases and these sources were documented in the dataset. Gender was

operationalized as a binary construct (male/ female) and collected by referencing the pronouns

used in various publicly available sources including institution websites, biographies, and news

releases (n=230). Race/ethnicity was also operationalized as a binary construct (white/ other) and

collected through references to race/ethnicity in news releases and biographies, or by referencing

the appearance of publicly available pictures online of each AAU CAO (n=230).

Human Capital. Three measures of human capital that existed in the original dataset

were utilized in this research study: *Terminal degree type, Academic discipline of terminal*

degree, and *STEM designation. Terminal degree type* refers to the type of terminal degree each

AAU CAO holds (e.g., PhD, JD, MD). *Academic discipline of terminal degree* refers to the

discipline of the terminal degree for each AAU CAO as classified by the CIP codes available in

IPEDs. *STEM designation* was determined by using the NSF STEM designations assigned by

CIP code. Programs that were categorized by NSF as STEM were coded accordingly (Yes/No).

Academic discipline of terminal degree and *STEM designation* were used to comprise *Terminal*

degree discipline- one measure of human capital examined in this research study.

I also collected three additional measures of human capital in constructing my database:

Prior experience, Academic career, and *Hire type. Prior experience* is comprised of two

measures: *Immediate prior position type* and *Time in prior position*. This data was collected from

publicly available online sources including the AAU institution websites, biographies, news releases, and the vitaes of the individual AAU CAOs, when available. *Immediate prior position type* refers to the title of the position each AAU CAO held prior to becoming the CAO of their respective AAU institution. To enable further analysis of this measure, I collapsed this data into 4 categories: CAO, Dean, Deputy/ Vice Provost, and Other academic administrator. *Time in prior position* is operationalized as the number of years each AAU CAO spent in their immediate prior position before their appointment as CAO of an AAU institution. *Academic career* is also comprised of two measures: *Time in academic career* and *Tenure Status. Time in academic career* was calculated using time at first tenure-track faculty appointment and time at current AAU CAO appointment. *Tenure status* refers to whether each AAU CAO is a tenured faculty member (recorded as yes/no). The data for these two measures was collected through each individual AAU CAO's vitae or biographies when a vitae was not available. Lastly, *Hire type* refers to whether each AAU CAO was an internal or external hire for the position of CAO at their respective AAU institution. This data was collected using the existing data collected by June and Bauman by creating a new field (*Hire Type*) from previous institution of employment. AAU CAOs who were previously employed at the same institution as their AAU CAO appointment were coded as internal hires whereas AAU CAOs who were previously employed at a different institution were coded as external hires.

  Cultural Capital. One measure of cultural capital existed in the original dataset and was analyzed in this research study: *Immediate prior institution of employment,* which refers to the name of each AAU CAO's previous institution of employment. I also collected data on five new measures of cultural capital including: *Prestige of academic institutions, Status of discipline, Research publications, H-index score, and Research grants.* The prestige of the AAU CAO's

academic institutions was captured through the following measures: *Prestige of undergraduate institution, Prestige of graduate institution,* and *Prestige of immediate prior institution of employment.* Prestige was operationalized in three ways: whether the academic institution is a member institution of the AAU (1= Yes, 0= No), whether the academic institution is a member institution of the Ivy League (1= Yes, 0= No), and whether the academic institution has a Carnegie classification of R1 (1= Yes, 0= No) (See Appendix C for Carnegie classifications). The data used to measure the prestige of academic institutions was collected from biographies or the individual vitaes of the AAU CAOs, when available. *Status of discipline* refers to the status of the CAO's discipline of their terminal degree. Two indicators of status based on Biglan's (1973) typology were used: Hard- Soft and Pure-Applied. Each of the CIP classifications for disciplines were categorized into a four-point scale to measure how Hard or Soft the discipline is (1= Hard, 2= Somewhat Hard, 3= Somewhat Soft, 4= Soft). The same approach was used to measure how Pure or Applied the discipline is (1= Pure, 2= Somewhat Pure, 3= Somewhat Applied, 4= Applied) (See Appendix D for typology and categorizations). *Research publications* was recorded as three separate measures: *Total number of research publications, Total number of first author research publications,* and *Total number of co-authored research publications. Total number of research publications* refers to the total number of research publications in the form of peer-reviewed journal articles each CAO had at the time of their appointment as CAO of an AAU institution. Similarly, *Total number of first author research publications* refers to the total number of first authored research publications in the form of peer-reviewed journal articles each CAO had at the time of their appointment. *Total number of co-authored research publications* refers to the total number of co-authored research publications in the form of peer-reviewed journal articles each CAO had at the time of their appointment. The data for these three measures

was collected from each individual AAU CAO's vitae or from the respective institution faculty web pages that listed the research publications of faculty members (when a vitae was not available. *H-index score* was recorded by looking up each individual AAU CAO in Google scholar and recording their h-index score as listed on their Google scholar page. Finally, *Research grants* was operationalized as two separate measures: *Total award amount of research grants* and *Total number of research grants*. *Total award amount of research grants* calculated the total dollar value in research grants each AAU CAO had been awarded at their time of appointment to CAO. *Total number of research grants* calculated the total number of research grants each AAU CAO had been awarded at the time of their appointment. The data for these two measures was collected from each individual AAU CAO's vitae, or their respective institution webpages that listed faculty research grants (when a vitae was not available).

  Social Capital. Finally, I collected data on two measures of social capital in the form of professional affiliations to measure and analyze in this research study: *Academic institution affiliations and Professional organization affiliations. Academic institution affiliations* refers to the names of the academic institutions each AAU CAO is affiliated with including their undergraduate institution, graduate institution, and immediate prior institution of employment. The data for this measure was collected from each individual AAU CAO's vitae, or from their respective biographies when a vitae was not available. *Professional organizations* refers to the names of the professional organizations each AAU CAO is affiliated with. The data for this measure was also collected from each individual AAU CAO's vitae, or from their respective biographies when a vitae was not available.

Data Analysis

I utilized several quantitative methods in this exploratory research study including descriptive statistics, t-tests for independent means, and Chi-square analysis. I first ran descriptive statistics (frequencies, means, and standard deviations) on the key measures of human capital, cultural capital, and social capital to identify common forms of capital among the AAU CAOs. I then employed either t-tests or chi square analyses depending on the nature of the variable under study, to ascertain whether the gender differences observed in the different forms of capital accumulated by the AAU CAOs in the sample were statistically significant (See Appendix B for the list of tests performed on each measure).

Chi-square analyses were employed for the categorical variables under study to uncover whether any gender differences exist in the various forms of human capital and cultural capital of the AAU CAOs. These variables included *Immediate prior position type, Tenure status, STEM designation, Status of discipline, and Prestige of academic institutions.* Test statistics and exact significance (*p*-values) are presented in the next chapter in the form of several data tables. All tests were conducted at the $\alpha = .05$ level of significance. One of the necessary assumptions for a one-way Chi-square analysis is to meet a minimum requirement for expected cell counts. For Chi-square analyses, it is recommended that these expected cell counts be at least five or more. To minimize the effects of expected count violations for the one-way Chi-square analysis, gender and race were coded as binary values (Male= 0; Female= 1; White= 0; Non-white=1) and *Immediate Prior Title* was collapsed into 4 categories, as previously noted. This reduced the likelihood that there was an n count of less than 5 in any given cell. T-tests for independent means were also conducted on the continuous variables of study to uncover whether any gender differences existed in the various forms of human capital and cultural capital of the AAU CAOs.

These variables included *Time in prior position, Time in academic career, Research publications, H-index,* and *Research grants.*

Trustworthiness

Regarding the methods I employed in this research study, my previous experience conducting quantitative research prepared me to design a research study that utilized these methods. To ensure the reliability and validity of the data I collected and the data that existed in the original dataset, I conducted cross checks and kept an audit trail of the sources used and key decisions made. Specifically, I cross checked the data collected by June and Bauman (2019) against the sources they noted in the dataset, and against more recent publicly available data online. For the additional data I collected, I cross referenced the data I recorded from institution websites, biographies, news releases, and faculty webpages against the vitaes collected for each AAU CAO, when available. Reliability of research results can also be demonstrated by providing an audit trail of the data collection process so that others can replicate the research study (Merriam, 1998). To ensure reliability of my data and research results, I denoted within the dataset the sources I used during the data collection process so that the data can be verified by other researchers if needed. I also kept detailed notes about the data collection process and subsequent analysis so that if any data was missing, I have a record as to why, or if any analyses had to be adjusted, the rationale for such decisions are documented.

Ensuring the validity and dependability of the results of this research study was demonstrated in two ways. Validity of the results was verified through the peer review process. Using peers to comment on one's research design and findings provides an external check for the researcher (Creswell, 2014; Merriam, 1998). I ensured the validity of my data analysis by engaging in peer review with my dissertation chair and dissertation committee members

throughout the data collection and analysis process. Dependability, or the collection of data consistent with the study's focus (Ravitch & Carli, 2006), was attained through the use of appropriate measures and data analysis procedures that have been utilized by other researchers in the field of higher education for similar measures of human capital, cultural capital, and social capital.

Limitations

While this research study contributes to the literature in several ways, the limitations of my research design should also be noted. The first possible limitation of my research design is the method of data collection used. The use of publicly available data introduces the risk that the data could be inaccurate or incomplete. To mitigate this risk I took several steps to ensure that the data was accurate including performing my own cross checks on the June and Bauman (2019) data by triangulating this data against my own online searches of the individual AAU CAOs to return the most up to date institution websites, biographies, news releases, faculty webpages, and vitaes to verify the data against. To account for turnover since the original data was collected, I also conducted a search of each AAU institution to confirm the current CAO and added any newly appointed CAOs to my dataset. This step ensured that the dataset was complete as of June 2020. As detailed in the previous section, I also left an audit trail so that other researchers could replicate the collection and analysis of my data if needed. However, these steps were not necessarily sufficient for ensuring the accuracy of the race/ethnicity data. Consistent with June and Bauman (2019), I collected race/ethnicity as a binary variable (white/ nonwhite) by referencing pictures available online for each CAO for the AAU CAOs appointed after January 2019. I also referenced institution websites, biographies, news releases, and faculty webpages for mentions of race/ethnicity for each AAU CAO. It is important to note that this

method of data collection is subject to the researcher's interpretation of another person's race/ ethnicity and may not be reflective of how a person identifies. In order to collect more accurate race/ethnicity data, I also requested the AAU CAOs to self-identify their race/ ethnicity via email or google form (See Appendix A). Unfortunately, a low response rate (11%, n=230) prevented me from examining differences in the accumulated forms of capital of the AAU CAOs by race/ethnicity. As a result, I only present descriptive statistics on race/ethnicity data in the following chapters to prevent potentially misleading or inaccurate findings and conclusions that could result from further analysis of the race/ethnicity data collected. The use of publicly available data also resulted in incomplete data for h-index scores. As discussed in the next chapter, I was only able to collect h-index data for 35% of the AAU CAOs in the sample. The AAU CAOs I was not able to collect h-index scores for were either not listed in Google scholar or were not assigned an h-index score. H-index scores were not developed until 2005 and Google scholar calculates these scores by analyzing citation patterns of articles within the Google scholar database. It is possible that the AAU CAOs I was not able to find an h-index score for published much of their research before Google scholar and h-indices were highly utilized and thus this data was not available.

A second possible limitation of my research design concerns the selection of the sample. At face value, limiting the study to only include the AAU CAOs could omit key backgrounds and experiences of CAOs outside of the AAU, and women CAOs specifically because women are less likely than men to hold the position of CAO at an AAU institution. However, the purpose of this research study was to identify key forms of capital among the AAU CAOs specifically, as well as any gender differences that exist. Thus, only those who have advanced to the position of CAO at an AAU institution have the forms of capital proven necessary for the

role. Attempting to account for the relative underrepresentation of women CAOs in the AAU by including other "qualified" individuals such as tenured women faculty at an AAU institution, or women CAOs at other institution types, assumes that they want to hold the position of CAO at an AAU institution, and thus are taking steps necessary to achieve that goal. This assumption could result in misleading conclusions about key forms of capital if there are differences between actual AAU CAOs and those that are "qualified" to be an AAU CAO. Given this line of thinking, this study limited its sample and focus to only the AAU CAOs appointed between 2008 and June 2020.

However, this decision is not devoid of limitations as it could result in null findings- a third potential limitation of my research study. That is, my analyses of the data may not reveal gender differences in key forms of capital among the men and women CAOs of the AAU. It is important to note null findings still have the potential to make a unique contribution to the field by bringing to light key forms of capital that have enabled individuals (regardless of gender) to become the CAO of a major research university. Thus, I decided to pursue my research study despite these potential limitations.

Conclusion

This chapter detailed the research design and methods utilized to (1) identify key forms of human capital, cultural capital, and social capital among the CAOs at the 63 research universities within the AAU, and (2) reveal differences in key forms of capital among the men and women CAOs of the AAU. To achieve this purpose, I created a more comprehensive database to examine my research questions. Throughout this chapter I discussed the steps I took to collect the data to construct this database and the methods I employed to analyze the data. A strength of my research design was the use of multiple measures of human capital, cultural

capital, and social capital that to my knowledge, have not yet been used to study CAOs. I also discussed the steps I took to ensure the reliability and validity of this research study including the use of appropriate methods of data analysis, conducting cross-checks of the data, leaving an audit trail, and undergoing the peer review process. In the next chapter, I present in detail the results of my data analysis.

Chapter Four

In this chapter I present the results of my data analysis. I begin by providing descriptive statistics of the sample of participants. I then re-state the research questions that were examined in this research study and present the results of the various quantitative analyses that were employed to explore my research questions and test my hypotheses. I conclude this chapter by summarizing the key findings and focus of the next chapter given these findings.

Descriptive Statistics

The participants in this research study were the AAU CAOs from 2008 to June 2020. The total sample (n=230) is comprised of 166 men CAOs (72%) and 64 women CAOs (28%). 86% of the AAU CAOs in the sample are white (n=230)[1]. Almost 90% of the AAU CAOs in the sample have a PhD, while only 6.52% have a professional terminal degree (e.g. JD or MD). Descriptive statistics of the total sample are provided in Table 1.

Table 1: *Descriptive statistics of the sample (n=230)*

Participant Demographics	n	%
Gender		
Female	64	27.83%
Male	166	72.17%
Race		
White	198	86.08%
Non White	32	13.91%
Terminal Degree Type		
None	2	0.87%
Both	8	3.48%
Professional	15	6.52%
PhD	205	89.13%

---

[1] The data collected for race/ethnicity could potentially be inaccurate. I referenced institution websites, biographies, news releases, and faculty webpages for mentions of race/ethnicity for each AAU CAO. However, this method of data collection is subject to the researcher's interpretation of another person's race/ ethnicity and may not be reflective of how a person identifies. While I did attempt to collect more accurate race/ethnicity data through methods of self-identification, a low response rate among the sample (11%, n=230) prevented me from verifying the race/ethnicity data collected from publicly available sources. As a result, I only present the race/ ethnicity data I collected as an overall description of the sample to prevent potentially misleading or inaccurate findings and conclusions that could result from further analysis of the race/ethnicity data collected.

Testing the Research Questions and Hypotheses

The following three research questions and twelve hypotheses were analyzed using quantitative methods including descriptive statistics, t-tests for independent means, and chi-square analysis. The results of this data analysis are organized by research question and then hypothesis. Descriptive statistics were used to explore key measures of human capital, cultural capital, and social capital among the CAOs in the sample. The key measures of human capital, cultural capital, and social capital examined can be found in Table 2. T-Tests for independent means and chi-square analysis were used to examine gender differences in the different measures of capital among the AAU CAOs. In instances where chi-square analysis was employed, a general null hypothesis that no difference exists between the men and women CAOs in the sample for the various measures of human capital, cultural capital, and social capital was tested. However, the chi-square statistic resulting from this omnibus test only reveals whether a statistically significant relationship exists. It does not reveal the nature of the relationship between the factors being examined (Thompson, 1988). As a result, post hoc tests were performed on statistically significant chi-square omnibus tests using a standardized residual approach (Beasley, 1995; Garcia-Perez & Nunez-Anton, 2003).

Table 2. *Measures of human capital, social capital, and cultural capital*

	n	%
Demographic data		
Name	230	100%
Email	230	100%
Start date	230	100%
End date	230	100%
Gender	230	100%
Race/ethnicity*	230	100%
Human capital data		
Prior position title	230	100%
Length of time in prior position	218	95%
Tenure status	230	100%

Length of time in academic career	214	93%
Academic discipline of terminal degree	230	100%
CIP code of terminal degree	230	100%
STEM designation	228	99%
Hire type	230	100%
Cultural capital data		
Undergraduate institution	226	98%
R1 designation (undergraduate institution)	226	98%
Ivy League designation (undergraduate institution)	226	98%
AAU designation (undergraduate institution)	226	98%
Graduate institution	222	97%
R1 designation (graduate institution)	222	97%
Ivy League designation (graduate institution)	222	97%
AAU designation (graduate institution)	222	97%
Immediate prior institution	225	98%
R1 designation (immediate prior institution)	225	98%
Ivy League designation (immediate prior institution)	225	98%
AAU designation (immediate prior institution)	225	98%
Status of discipline (Hard-Soft)	212	92%
Status of discipline (Pure-Applied)	228	99%
Number of publications (total)	169	73%
Number of publications (first-author)	143	62%
H-index score	80	35%
Number of research grants (total)	111	48%
Research grants award value (total)	70	30%
Social capital data		
Academic institution affiliations		
Undergraduate institution	226	98%
Graduate institution	222	97%
Immediate prior institution	225	98%
Professional organization affiliations	206	90%

*Data collected from publicly available sources. Data collected from method of self-identification of race/ethnicity (n=25, 11%)

Human Capital

Research Question 1: What are key forms of human capital accumulated by CAOs of AAU institutions from 2008 to June 2020? 1a). What gender differences, if any, exist in the human capital of the CAOs of the AAU institutions?

Several measures of human capital were analyzed including *Prior experience*, which was

determined by *Title of immediate prior position* and *Length of time in immediate prior position*.

Academic career, which was determined by *Tenure status* and *Length of time in academic career. Terminal degree discipline*, which was determined by *CIP classification. STEM designation*, which was determined by the NSF STEM classification. Finally, *Hire type*- whether they were in internal or external hire. This research question will be examined using the following four hypotheses:

H$_1$ *Men and women CAOs will have different prior experiences before their appointment as CAO of an AAU institution*

The titles of the immediate prior position each CAO held prior to their appointment as CAO of an AAU institution were categorized into 7 groups. The most common immediate prior position held by the CAOs in the sample was Dean (53.48%) followed by Vice Provost/ Deputy Provost (14.78%) and other academic administrator (16.09%). Descriptive statistics of the total sample are provided in Table 3.

Table 3. *Descriptive statistics of immediate prior position (n=230)*

Immediate Prior Position	Total		Male		Female	
	n	*%*	*n*	*%*	*n*	*%*
CAO	14	6.09%	10	6.02%	4	6.25%
Dean	123	53.48%	88	53.01%	35	54.69%
Other Academic Administrator	37	16.09%	31	18.67%	6	9.38%
Outside of Higher Ed	4	1.74%	3	1.81%	1	1.56%
Vice Provost/ Deputy Provost	34	14.78%	20	12.05%	14	21.88%
President	5	2.17%	3	1.81%	2	3.13%
Professor	13	5.65%	11	6.63%	2	3.13%

As a result of the small sample sizes among the following positions: Outside of Higher Ed, President, and Professor, these positions were collapsed into one group called "Other Academic Administrator". Results of the chi-square analysis indicate there is no significant difference, $\chi_2(3, n=230) = 5.522$, $p = .137$, between the percentages of men and women CAOs in the sample's

immediate previous position type as indicated in Table 4. Therefore, I failed to reject the general

null hypothesis that there are no differences between men and women CAO's immediate prior

position type. Given these findings, hypothesis H_1 that men and women CAOs will have different

prior experiences before their appointment as CAO of an AAU institution was not supported by

the data.

Table 4. *Chi-square test: Immediate prior position type*

| Immediate Prior Position | Gender | | χ^2 | *df* |
	Men	Women		
	10	4	5.522	3
CAO	(-0.1)	(0.1)		
	88	35		
Dean	(-0.2)	(0.2)		
	20	14		
Vice Provost/ Deputy Provost	(-1.9)	(1.9)		
	48	11		
Other Academic Administrator	(1.8)	(-1.8)		

Note. Standardized residuals appear in parentheses below group frequencies

The mean length of time the CAOs in the sample spent in their immediate prior position was

5.20 years. Almost 28% of the CAOs in the sample spent 3-4 years in their immediate prior

position before assuming the role of CAO at an AAU institution. Men spent slightly more time in

their immediate prior position (5.40 years) compared to women (4.67 years).

Table 5: *Descriptive statistics of time in immediate prior position (n=218)*

Time in Immediate Prior Position (years)	n	Mean	s.d.
Male	158	5.40	4.34
Female	60	4.67	2.62
Total	218	5.20	3.95

Figure 1. *Mean length of time in immediate prior position by gender*
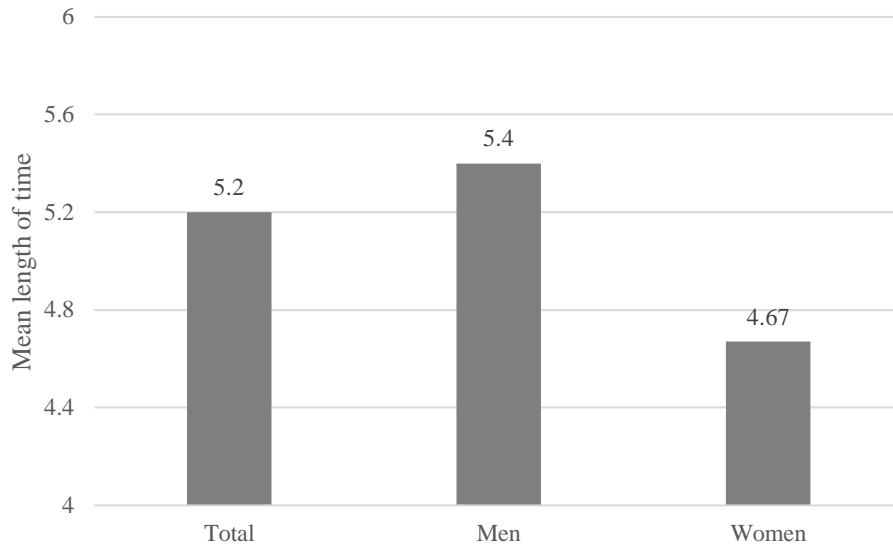
However, no significant differences were found in length of time spent in immediate previous position of the men and women CAOs in the sample, $t(216) = 1.22$, $p = .223$. The results of the *t*-test performed are displayed in Table 6. The results suggest the observed difference between the men and women CAO's mean length of time in previous position men was due to chance rather than an actual difference in length of time spent in their immediate prior position.

Table 6. *t-Test: Length of time in immediate prior position*

| | Gender | | *t* | *df* |
	Men	Women		
	5.40	4.67	1.22	216
Time in Prior Position	(4.34)	(2.62)		

Note. Standard deviation is in parenthesis under mean score

H₂   *The majority of AAU CAOs will be tenured faculty however, women will have longer academic careers before appointment to the role of CAO at an AAU institution compared to men AAU CAOs*

In support of hypothesis H₂, the majority of AAU CAOs in the sample were tenured faculty members (92%). This finding is consistent across gender with 92.17% of the men CAOs and 93.75% of the women CAOs in the sample achieving tenure.

Table 7. *Chi-square test: Tenure status*

Terminal Degree Type	Gender		χ^2	df
	Men	Women		
Not Tenured	12	3	0.494	1
	(0.7)	(-0.7)		
Tenured	153	60		
	(-0.7)	(0.7)		

Note. Adjusted standardized residuals appear in parentheses below group frequencies

The mean length of time between first tenure-track faculty appointment and time of appointment to AAU CAO was 27 years. Almost 49% of the CAOs had a 21-30-year academic career prior to their appointment as CAO of an AAU institution. The women CAOs had a slightly higher mean academic career (27.18 years) than the men CAOs in the sample (26.91 years). Descriptive statistics of the total sample are provided in Table 8.

Table 8: *Descriptive statistics of the time in academic career of the AAU CAOs (n=214)*

Time in Academic Career (years)	n	Mean	s.d.
Male	158	26.91	7.57
Female	56	27.18	7.61
Total	214	26.98	7.56

No significant differences were found in length of time spent in academic career between the men and women CAOs in the sample, $t(212) = -.232$, $p = .817$. The results of the *t*-test performed are displayed in Table 9. The probability that the observed difference between men CAO's mean of 26.91 years and the women CAO's mean of 27.18 years was due to chance rather than to a real difference in length of time of their academic career. Given this finding, hypothesis H_2 that women will have longer academic careers was not supported.

Table 9. *t-Test: Length of time in academic career*

	Gender		t	df
	Men	Women		
Time in Academic Career	26.91	27.18	-0.232	212
	(7.56)	(7.61)		

H[3]   *Women AAU CAOs will have different academic backgrounds in terms of discipline of terminal degree than men AAU CAOs; More men AAU CAOs will have STEM backgrounds than women AAU CAOs*

The most common disciplines of the terminal degrees held by the AAU CAOs in the sample was economics (n=13), followed by physics (n=11), electrical and electronics engineering (n=10), and law (n=10). Descriptive statistics of the total sample are provided in Table 10. When categorized by CIP codes, the most common academic disciplines of the AAU CAOs were engineering (n=38), physical sciences (n=34), and social sciences (n=34). Unfortunately, the sample sizes within each discipline were too small to examine gender differences by CIP classification of terminal degree.

Table 10: *Descriptive statistics of the terminal degrees of the AAU CAOs (n=230)*

CIP Classification of Terminal Degrees	n	%
Engineering	38	16.5
Physical sciences	34	14.8
Social sciences	34	14.8
Biological and biomedical sciences	28	12.2
Psychology	15	6.5
History	11	4.8
Law	10	4.3
Agriculture, agriculture operations, and related sciences	6	2.6
Computer and information sciences and support services	6	2.6
Foreign languages, literatures, and linguistics	6	2.6
Mathematics and statistics	6	2.6
Business, management, marketing, and related support services	6	2.6
Education	4	1.7
English language and literature/letters	4	1.7
Philosophy and religious studies	4	1.7
Medicine	4	1.7
Public administration and social service professions	2	0.9
Health professions and related clinical sciences	2	0.9
Communication, journalism, and related programs	2	0.9
Liberal arts and sciences, general studies and humanities	1	0.4
Multi/interdisciplinary studies	1	0.4
Architecture and related services	1	0.4

Area, ethnic, cultural, and gender studies	1	0.4
Visual and performing arts	1	0.4
Pharmacy	1	0.4
N/A	2	0.9

Just over half of the AAU CAOs in the sample come from non-STEM disciplines (54%). While more than half of the men CAOs in the sample have a terminal degree outside of the STEM disciplines (57%), more than half of women AAU CAOs have terminal degrees in a STEM discipline (55%).

Table 11: *Descriptive statistics of STEM designation (n=228)*

	Total		Male		Female	
STEM Designation	*n*	*%*	*n*	*%*	*n*	*%*
STEM	104	45.22%	69	42.07%	35	54.69%
Non-STEM	124	53.91%	95	57.93%	29	45.31%

However, the results of the chi-square analysis indicate there is no significant difference, $\chi^2(1, n=228) = 2.95$, $p = .086$, between the percentages of men and women CAOs in the sample's terminal degree being designated as STEM as indicated in Table 11. Therefore, I failed to reject the general null hypothesis that there are no differences between men and women CAO's terminal degree classification (STEM or Non STEM). Given these findings, I could not conclude that the men and women AAU CAOs have different academic backgrounds as hypothesized in hypothesis H_3.

Table 12. *Chi-square test: STEM designation*

	Gender			
STEM Designation	Men	Women	χ^2	*df*
	69	35	2.953	1
Non STEM	(-1.7)	(1.7)		
	95	29		
STEM	(1.7)	(-1.7)		

Note. Adjusted standardized residuals appear in parentheses below group frequencies

H₄   *More women AAU CAOs will be internal hires than men AAU CAOs*

The majority of the AAU CAOs in the sample are internal hires (68.70%). Interestingly, 72.29% of the men CAOs are internal hires compared to only 59.38% of the women CAOs in the sample (see Table 13).

Table 13. *Descriptive statistics of hire type among the AAU CAOs (n=230)*

	Total		Male		Female	
Hire Type	n	%	n	%	n	%
External hire	72	31.30%	46	27.71%	26	40.63%
Internal hire	158	68.70%	120	72.29%	38	59.38%

However, the results of the chi-square analysis indicate there is no significant difference, $\chi^2(1,$ $n=230) = 3.58$, $p = .058$, between the percentages of men and women CAOs hired from within the institution as indicated in Table 14. Therefore, I failed to reject the general null hypothesis that there are no differences between men and women CAO's hire type. Given these findings, I did not find support for hypothesis H₄ that more women AAU CAOs will be internal hires than men AAU CAOs.

Table 14. *Chi-square test: Hire type*

Hire type	Gender		χ^2	df
	Men	Women		
	120	38	3.58	1
Internal	(1.9)	(-1.9)		
	46	26		
External	(-1.9)	(1.9)		

*p-value < .05
Note. Adjusted standardized residuals appear in parentheses below group frequencies

Cultural Capital

Research Question 2: What are key forms of cultural capital accumulated by CAOs of AAU institutions from 2008 to June 2020? 2a). What gender differences, if any, exist in the cultural capital of the CAOs of the AAU institutions?

Several measures of cultural capital were analyzed including *Prestige of undergraduate institution* as determined by AAU, Ivy League, and Carnegie Classification (R1) status, *Prestige of graduate institution* as determined by AAU, Ivy League, and Carnegie Classification (R1) status, and *Prestige of immediate prior institution of employment* as determined by AAU, Ivy League, and Carnegie Classification (R1) status, *Status of discipline* as determined by Biglan's typology of Hard-Soft and Pure-Applied disciplines, *Research publications* was operationalized as the total number of publications, total number of first author publications, and total number of co-authored publications for each AAU CAO in the sample, *h-index score* as indicated by the h-index score determined by Google Scholar for each AAU CAO, and *Research grants* was operationalized as the total number of research grant awards, and the total award value of all research grants among the AAU CAOs in the sample.

H₅   *Men AAU CAOs are more likely than women AAU CAOs to have graduated from prestigious institutions as indicated by membership in the AAU, membership in the Ivy League, and R1 Carnegie classification*

The prestige of the AAU CAO's academic affiliations was also analyzed. Descriptive statistics are presented in Table 15. Among the CAOs in the sample, almost half (47.80%) went to an AAU institution for their undergraduate education. When looking at undergraduate institution by gender however, 36.50% of women went to an AAU institution compared to 52.10% of the men CAOs. The majority of the CAOs in the sample went to an R1 undergraduate institution (60.60%). This finding was consistent for both men and women CAOs in the sample (63.80% and 52.40%, respectively). While most of the AAU CAOs did not attend an Ivy League institution (68.60%), 21.50% of the men CAOs went to an Ivy League undergraduate institution, compared to only 11.10% of the women CAOs in the sample.

Table 15: *Descriptive statistics of the undergraduate academic institutions of the AAU CAOs in the sample using various indicators of prestige (n=226)*

Indicators of Prestige

Undergraduate Institution	Total		Male		Female	
	n	*%*	*n*	*%*	*n*	*%*
AAU						
Non AAU	89	39.40%	60	36.80%	29	46.00%
AAU	108	47.80%	85	52.10%	23	36.50%
Not applicable*	29	12.80%	18	11.00%	11	17.50%
R1 Carnegie Classification						
Non R1	60	26.50%	41	25.20%	19	30.20%
R1	137	60.60%	104	63.80%	33	52.40%
Not applicable*	29	12.80%	18	11.00%	11	17.50%
Ivy League						
Non Ivy	155	68.60%	110	67.50%	45	71.40%
Ivy	42	18.60%	35	21.50%	7	11.10%
Not applicable*	29	12.80%	18	11.00%	11	17.50%

* Not applicable institutions consist of academic institutions outside of the U.S. and therefore cannot be categorized using these measures

Results of the chi-square analysis indicated there is no significant difference, $\chi^2(2, n=226) = 4.765$, $p = .092$, between the percentages of men and women CAOs in the sample's prestige of their undergraduate institution as indicated by AAU status (see Table 16). There was also no significant difference, $\chi^2(2, n=226) = 2.865$, $p = .239$, between the percentages of men and women CAOs in the sample's prestige of their undergraduate institution as indicated by R1 status. Finally, there is no significant difference, $\chi^2(2, n=226) = 4.186$, $p = .123$, between the percentages of men and women CAOs in the sample's prestige of their undergraduate institution as indicated by Ivy League status. Therefore, I reject the hypothesis that men AAU CAOs are more likely than women AAU CAOs to have graduated from prestigious undergraduate institutions.

Table 16. *Chi-square test: Prestige of undergraduate institution*

Indicators of Prestige

Undergraduate Institution	Gender		χ^2	*df*
	Men	Women		
AAU				
Non AAU	60	29	4.765	2

	(-1.27)	(-1.27)		
AAU	85	23		
	(-2.11)	(-2.11)		
R1				
Non R1	41	19	2.865	2
	(-0.76)	(0.76)		
R1	104	33		
	(-1.58)	(-1.58)		
Ivy League				
Non Ivy League	110	45	4.186	2
	(-0.57)	(-0.57)		
Ivy League	35	7		
	(-1.80)	(-1.80)		

Note. Adjusted standardized residuals appear in parentheses below group frequencies

Among the CAOs in the sample, the majority (83.91%) went to an AAU institution for their graduate education. This finding was consistent among both the men and women CAOs in the sample (84.34% and 82.81%, respectively). An overwhelming majority of the CAOs in the sample went to an R1 graduate institution (91.74%). This finding was also consistent for both men and women CAOs in the sample (92.77% and 89.06%, respectively). Similar to the undergraduate institution findings, only 20.43% of the CAOs in the sample went to an Ivy League institution for their graduate education. Descriptive statistics of the total sample are provided in Table 17.

Table 17: *Descriptive statistics of the graduate academic institutions of the AAU CAOs in the sample using various indicators of prestige (n=222)*

Indicators of Prestige						
	Total		Male		Female	
Graduate Institution	*n*	*%*	*n*	*%*	*n*	*%*
AAU						
Non AAU	32	13.91%	21	12.65%	11	17.19%
AAU	193	83.91%	140	84.34%	53	82.81%
Not applicable	5	2.17%	5	3.01%	0	
R1 Carnegie Classification						
Non R1	11	4.78%	6	3.61%	5	7.81%

102

R1	211	91.74%	154	92.77%	57	89.06%
Not applicable	8	3.48%	6	3.61%	2	3.13%
Ivy League						
Non Ivy	175	76.09%	125	75.30%	50	78.13%
Ivy	47	20.43%	35	21.08%	12	18.75%
Not applicable	8	3.48%	6	3.61%	2	3.13%

* Not applicable institutions consist of academic institutions outside of the U.S. and therefore cannot be categorized using these measures

Results of the chi-square analysis indicated there is no significant difference, $\chi^2(1, n=222) = 0.645$, $p = .422$, between the percentages of men and women CAOs in the sample's prestige of their graduate institution as indicated by AAU status (see Table 18). There was also no significant difference, $\chi^2(1, n=222) = 1.766$, $p = .184$, between the percentages of men and women CAOs in the sample's prestige of their graduate institution as indicated by R1 status. Finally, there was also no significant difference, $\chi^2(1, n=222) = 0.170$, $p = .680$, between the percentages of men and women CAOs in the sample's prestige of their graduate institution as indicated by Ivy League status. Therefore, I reject the hypothesis that men AAU CAOs are more likely than women AAU CAOs to have graduated from a prestigious institution for their graduate education. Both men and women CAOs of the AAU institutions were likely to have graduated from a prestigious graduate institution as indicated by AAU and R1 status. While the majority of the CAOs in the sample did not attend an Ivy League institution (76.09%), the other two measures of prestige reject this hypothesis.

Table 18. *Chi-square test: Prestige of graduate institution*

Indicators of Prestige				
	Gender			
Graduate Institution	Men	Women	χ^2	*df*
AAU				
Non AAU	21 (-0.8)	11 (-0.8)	0.645	1

AAU	140 (-0.8)	53 (-0.8)		
R1				
Non R1	6 (-1.3)	5 (1.3)	1.766	1
R1	154 (1.3)	57 (-1.3)		
Ivy League				
Non Ivy League	125 (-0.4)	50 (0.4)	0.17	1
Ivy League	35 (0.4)	12 (-0.4)		

Note. Adjusted standardized residuals appear in parentheses below group frequencies

H$_6$ *Men AAU CAOs are more likely than women AAU CAOs to have previously worked at a prestigious institution as indicated by membership in the AAU, membership in the Ivy League, and R1 Carnegie classification*

Among the CAOs in the sample, the majority worked at an AAU institution in their previous position of employment (92.17% of men and 89.06% of women). Approximately 96% of both the men and women CAOs in the sample previously worked at an R1 institution prior to assuming the role of CAO at an AAU institution. Only 8.70% of the CAOs in the sample previously worked at an Ivy League institution.

Table 19. *Descriptive statistics of the immediate prior institutions of employment of the AAU CAOs in the sample using various indicators of prestige (n=225)*

Indicators of Prestige	Total		Male		Female	
	n	*%*	*n*	*%*	*n*	*%*
AAU						
Non AAU	13	5.65%	8	4.82%	5	7.81%
AAU	212	92.17%	155	93.37%	57	89.06%
Not applicable	5	2.17%	3	1.81%	2	3.13%
R1 Carnegie Classification						
Non R1	4	1.74%	4	2.41%	0	0.00%
R1	221	96.09%	159	95.78%	62	96.88%
Not applicable	5	2.17%	3	1.81%	2	3.13%
Ivy League						
Non Ivy	205	89.13%	145	87.35%	60	93.75%
Ivy	20	8.70%	18	10.84%	2	3.13%
Not applicable	5	2.17%	3	1.81%	2	3.13%

* Not applicable institutions consist of academic institutions outside of the U.S. and therefore cannot be categorized using these measures

Results of the chi-square analysis indicated there is no significant difference, $\chi_2(1, n=225) = 0.822$, $p = .386$, between the percentages of men and women CAOs in the sample's prestige of their immediate prior institution of employment as indicated by AAU status (see Table 20). There was also no significant difference, $\chi_2(1, n=225) = 1.549$, $p = .213$, between the percentages of men and women CAOs in the sample's prestige of their immediate prior institution of employment as indicated by R1 status. Finally, there was also no significant difference, $\chi_2(1, n=225) = 3.389$, $p = .066$, between the percentages of men and women CAOs in the sample's prestige of their immediate prior institution of employment based as indicated by Ivy League status. Both men and women AAU CAOs were likely to have previously worked at a prestigious institution prior to their appointment as CAO of an AAU institution as indicated by AAU and R1 status. Therefore, I reject the hypothesis that men AAU CAOs are more likely than women AAU CAOs to have previously worked at a prestigious institution.

Table 20. *Chi-square test: Prestige of immediate prior institution of employment*

Indicators of Prestige				
	Gender			
Immediate Prior Institution	Men	Women	X2	df
AAU				
Non AAU	8 (-0.9)	5 (0.9)	0.822	1
AAU	155 (0.9)	57 (-0.9)		
R1				
Non R1	4 (1.2)	0 (-1.2)	1.549	1
R1	159 (-1.2)	62 (1.2)		
Ivy League				
Non Ivy League	145 (-1.8)	60 (1.8)	3.389	1
Ivy League	18 (1.8)	2 (-1.8)		

H[7]   *Women AAU CAOs will be concentrated in "lower status" disciplines compared to men AAU CAOs as indicated by Biglan's (1973) typology of Hard-Soft and Pure-Applied disciplines*

Using Biglan's typology of Hard-Soft and Pure-Applied disciplines (see Appendix D for typology and full list of categorizations) the disciplines of 212 of the AAU CAO's terminal degrees in the sample were assigned a rating of 1= Hard, 2=Somewhat hard, 3= Somewhat soft, and 4=Soft. 43.50% of the CAOs in the sample have a terminal degree in a Hard discipline. Almost half (46.40%) of the men CAOs have a terminal degree in a Hard discipline whereas 35.90% of the women CAOs hold a terminal degree in a Hard discipline. 31.30% of the women CAOS in the sample have a terminal degree in a Somewhat soft discipline. Similarly the disciplines of 228 of the AAU CAO's terminal degrees in the sample were assigned a rating of 1= Pure, 2=Somewhat pure, 3= Somewhat applied, and 4=Applied. Among the CAOs in the sample, the greatest number of terminal degrees were categorized as Somewhat pure (35.96%). The women CAOs in the sample had a slightly higher proportion of terminal degrees in a Somewhat pure discipline (45.31%) compared to the men CAOs (32.32%). Descriptive statistics of the total sample are provided in Table 21.

Table 21: *Descriptive statistics of the categorization of terminal degrees of the AAU CAOs in the sample using Biglan's (1973) typology*

Status of Discipline	Total		Male		Female	
	n	%	n	%	n	%
Hard v. Soft						
Hard	100	43.50%	77	46.40%	23	35.90%
Somewhat hard	12	5.20%	10	6.00%	2	3.10%
Somewhat soft	63	27.40%	43	25.90%	20	31.30%
Soft	37	16.10%	22	13.30%	15	23.40%
Pure v. Applied						
Pure	57	25.00%	42	25.61%	15	23.44%
Somewhat pure	82	35.96%	53	32.32%	29	45.31%

Somewhat applied	56	24.56%	50	30.49%	6	9.38%
Applied	33	14.47%	19	11.59%	14	21.88%

Note. Law and medical fields were not included in Biglan's (1973) original typology of Hard-Soft disciplines and so they are excluded from this analysis

Results of the chi-square analysis indicated there is no significant difference, $\chi^2(4, n=212) =$ 5.504, $p = .239$, between the percentages of men and women CAOs in the sample's status of their terminal degree using Biglan's (1973) Hard-Soft typology as indicated in Table 22. Therefore, I failed to reject the general null hypothesis that there is no difference between the prestige of men and women CAO's terminal degree disciplines when using Biglan's (1973) Hard-Soft typology.

Table 22. *Chi-square test: Status of discipline Hard-Soft and Pure-Applied*

Status of Discipline	Gender		χ^2	df
	Men	Women		
Hard-Soft				
Hard	77	23	5.504	4
	(1.5)	(-1.5)		
Somewhat Hard	10	2		
	(0.9)	(-0.9)		
Somewhat Soft	43	20		
	(-0.8)	(0.8)		
Soft	22	15		
	(-1.9)	(1.9)		
Not applicable	13	4		
	(0.4)	(-0.4)		
Pure-Applied				
Pure	42	17	13.96**	3
	(-0.20)	(0.20)		
Somewhat Pure	56	31		
	(-1.97)	(1.97)		
Somewhat Applied	48	5		
	(3.41)	(-3.41)		
Applied	17	11		
	(-1.44)	(1.44)		

Note. Adjusted standardized residuals appear in parentheses below group frequencies

However, results of the chi-square analysis indicated there is a statistically significant gender difference, $\chi^2(3, n=228) = 13.96$, $p = .007$, in the status of the men and women AAU CAO's terminal degrees using Biglan's (1973) Pure-Applied typology as indicated in Table 22. The

observed count of women with a terminal degree in a "Somewhat applied" discipline (n=6) was

lower than the expected count (n=15.72), while the observed count of men with a terminal

degree in a Somewhat applied discipline (n=50) was higher than the expected count (n=40.28).

On the other hand, the observed count of women with a terminal degree in a Somewhat pure

discipline (n=29) was higher than expected (n=23.02). The observed count of men with a

terminal degree was in a Somewhat pure discipline (n=53) was lower than expected (n=58.98).

To determine if these differences were statistically significant, a post-hoc test using the

standardized residual method was utilized (Beasley, 1995; Garcia-Perez & Nunez-Anton, 2003).

The standardized residuals in four cells (+/- 1.98 and +/- 3.33) significantly contributed to the

statistically significant omnibus chi-square statistic. The statistical significance of the observed

differences between was confirmed using a standardized residual post hoc test and a Bonferroni

corrected p-value of .006. Using this p-value I was able to conclude that the women CAOs were

significantly less likely to hold a terminal degree in a Somewhat applied discipline compared to

the men CAOs in the sample (9.38% compared to 30.49%, respectively).

H8   *Men AAU CAOs will have a greater number of research publications including
        more single-author and co-authored research publications than women AAU
        CAOs*

Data on the total number of research publications each CAO had published at the time of

their appointment was available for 169 of the AAU CAOs in the sample. This data was

retrieved from the individual CAO's vitaes, institution websites, or personal websites. The mean

total number of research publications among the AAU CAOs in the sample was 81.83. The men

CAOs in the sample had a greater mean number of total research publications (91.05) compared

to the women CAOs in the sample (58.60). The mean total number of first author publications

among all of the AAU CAOs in the sample was 20.74. The men CAOs in the sample had a mean

of 22.45 publications while the women CAOs in the sample had a mean of 20.74 total first-author research publications. The overall mean number of co-authored research publications was 58.71, with the men CAOs having a higher mean (66) number of co-authored research publications than the women CAOs in the sample (40.69).

Table 23. *Descriptive Statistics: Research publications*

Research Publications	n	Minimum	Maximum	Mean
Total Research Publications				
Men	121	2	422	91.05
Women	48	6	205	58.60
Total	169	2	422	81.83
Total Research Publications First Author				
Men	101	0	85	22.45
Women	41	1	74	15.24
Total	143	0	85	20.74
Total Research Publications Co Author				
Men	89	0	337	66.00
Women	36	0	181	40.69
Total	125	0	337	58.71

Note. Statistical outliers removed

The results of the *t*-tests performed are displayed in Table 24. There were statistically significant differences observed between the men and women CAOs in the sample regarding the total number of research publications, $t(168) = 2.453$, $p = .007$. The men CAOs in the sample's mean total number of research publications (91.05) compared to the women CAO's mean number of total research publications (58.60) was significantly higher. Similarly, the men CAO's mean total number of first-author research publications (22.45) was significantly higher than the women CAO's mean number of first-author research publications (15.24), $t(140) = 2.453$, $p = .008$. Likewise, the men CAO's mean total number of co-authored research publications (66) was significantly higher than the women CAO's mean number of co-authored research publications (40.69), $t(123) = 1.909$, $p = .045$. These findings support hypothesis H_8 that men AAU CAOs

will have a greater number of research publications than women AAU CAOs, including first-authored and co-authored publications.

Table 24. *t-Test: Number of research publications*

| Research Publications | Gender | | t | df |
	Men	Women		
Total number of publications	91.05 (85.42)	58.60 (52.27)	2.453**	167
Total first author publications	22.45 (17.78)	15.24 (9.48)	2.453**	140
Total co-authored publications	66.00 (73.12)	40.69 (48.82)	1.909*	123

*p-value <.01
**p-value <.05
Note. Statistical outliers removed; Standard deviation is in parenthesis under mean score

H[9]   *Men AAU CAOs will have a higher h-index score than women AAU CAOs*

Among the AAU CAOs in the sample, data on the h-index scores were collected for 80 CAOs. The mean h-index score among all of the AAU CAOs in the sample was 48.98. Men had a slightly higher mean h-index score (49.90) than the women AAU CAOs (46.38). The maximum h-index score was 170, while the minimum h-index score was 1 among the AAU CAO's in the sample.

Table 25. *Descriptive statistics of h-index scores (n=80)*

H-index score	N	Minimum	Maximum	Mean
Men	21	12	87	49.90
Women	59	1	170	46.38
Total	80	1	170	48.98

Table 26. *t-Test: Mean h-index score by gender*

| | Gender | | t | df |
	Men	Women		
H- index score	49.90 (29.57)	46.38 (22.73)	.495	78

Note. *= p < .05.

110

The results of the *t*-tests performed are displayed in Table 26. There were no statistically

significant differences observed between the men and women CAOs in the sample regarding

their h-index scores. It is important to note that I was only able to find the h-index scores for 80

of the 230 AAU CAOs. As a result, this null finding could be a result of the low sample size and

should be interpreted with caution. However, this finding suggests there is no difference in h-

index scores between men and women AAU CAOs.

H[10]   *Men AAU CAOs will have greater total number of research grants and a greater*
        mean total dollar amount of research grants than women AAU CAOs

Among the AAU CAOs in the sample, information on the number of research grants they

have been awarded was collected for 111 CAOs. The mean total number of research grants was

14.05. Women had a slightly higher mean (14.29) compared to the men AAU CAOs (13.93). The

maximum number of research grants was 50, while the minimum number of research grants

reported by the CAO's in the sample was 0.

Table 27. *Descriptive statistics of total number of research grants (n=111)*

Total number of research grants	N	Minimum	Maximum	Mean
Men	74	0	50	13.93
Women	37	0	41	14.29
Total	111	0	50	14.05

The results of the *t*-tests performed are displayed in Table 28. No significant differences were

found in the total number of research grants among the men and women CAOs in the sample,

$t(109) = -.134$, $p = .246$. The probability that the observed difference between the men CAO's

mean total number of research grants (13.93) and the women CAO's mean (14.29) was due to

chance rather than an actual difference in their total number of grants awarded. Thus, I did not

find support for hypothesis H[10].

Table 28. *t-Test: Total number of research grants*

	Gender		*t*	*df*
	Men	Women		
Total number of research grants	13.93 (14.00)	14.29 (12.55)	-.134	109

I was able to collect information on grant award values for 70 of the AAU CAOs in the sample. The dollar value of each grant award was recorded and then a total award value was calculated for each of the AAU CAOs in the sample. The mean total award value in research grants among the AAU CAOs in the sample was approximately 16.7 million dollars. The men CAOs had a slightly higher mean award value than the women CAOs in the sample (17.6 million and 14.6 million, respectively).

Table 29. *Descriptive Statistics: Total award value of research grants (n=70)*

Total Award Value of Research Grants	n	Minimum	Maximum	Mean
Men	50	$70,000	$261,193,073	$17,602,648
Women	20	$428,873	$119,259,591	$14,614,730
Total	70	$70,000	$261,193,073	$16,748,957

Note. Statistical outliers removed

The results of the *t*-test performed are displayed in Table 30. No significant differences were found in the total award values of research grants among the men and women CAOs in the sample, $t(68) = .313$, $p = .720$. The probability that the observed difference between the men CAO's mean total award value of their research grants (17.6 million) and the women CAO's mean (14.6 million) was due to chance rather than an actual difference in their total grant award values. Thus, I did not find support for hypothesis H_{10}.

Table 30. *t-Test: Total award value of research grants*

	Gender		*t*	*df*
	Men	Women		
Total award value of research grants	$ 17,602,648 ($ 44,081,499)	$ 14,614,730 ($ 30,604,716)	0.313	68

Note. Statistical outliers removed; Standard deviation is in parenthesis under mean score

Social Capital

Research Question 3: What are key forms of social capital accumulated by CAOs of AAU institutions from 2008 to June 2020? Specifically, do any common professional affiliations emerge among the AAU CAOs in this study?

The following measures of social capital were analyzed including *Academic institution affiliations,* including immediate prior institution of employment, undergraduate institution, and graduate institution, and *Professional organization affiliations* among the AAU CAOs in the sample.

H_{11} *The AAU CAOs will have multiple academic institution affiliations, and there will be common affiliations among them*

Overall, 71% of the AAU CAOs in the sample had three different academic institution affiliations as determined by their undergraduate institution, graduate institution, and immediate prior institution of employment. 26% had two different academic institution affiliations meaning that they went to the same undergraduate and graduate institution, or previously worked at an institution that they received their undergraduate or graduate degree from. Only 3% of the AAU CAOs in the sample went to undergraduate and graduate school at the same institution, and later worked at that same institution prior to assuming their role as CAO of an AAU institution.

The most common undergraduate institution among the AAU CAOs in the sample were Harvard University (n=10) followed by University of California-Berkeley (n=8) and Cornell University (n=7) (see Table 31 and Figure 2). Interestingly, while only 18.60% of the AAU CAOs in the sample attended an Ivy League institution for their undergraduate education, 5 out of the top 10 most common academic institution affiliations are Ivy League institutions.

Table 31: *Descriptive statistics of the undergraduate academic institutions of the AAU CAOs in the sample*

Undergraduate Institution	n
Harvard University	10
University of California-Berkeley	8
Cornell University	7
Brown University	6
Yale University	6
Princeton University	5
Stanford University	5
Dartmouth College	4
University of Notre Dame	4
Michigan State University	4
University of Minnesota-Twin Cities	4

Figure 2. Bubble Chart of undergraduate institutions
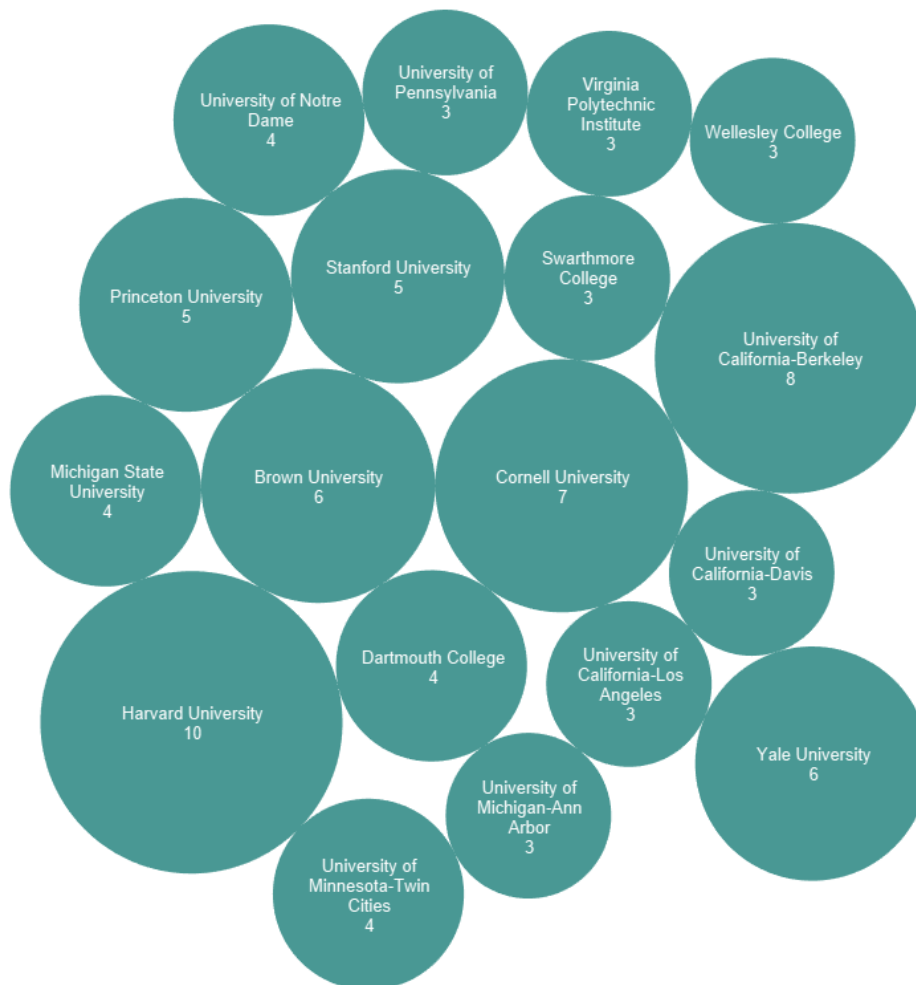
Similar to the above findings for undergraduate institutions, the most common graduate

institutions among the AAU CAOs in the sample were Harvard University (n=17) and University

of California-Berkeley (n=17), followed by Massachusetts Institute of Technology (n=13) (see

Table 32 and Figure 3). Of note, all of the institutions in Table 32, which represent the most

common graduate academic institution affiliations among the AAU CAOs in the sample, are R1

and AAU institutions.

Table 32: *Descriptive statistics of the graduate academic institutions of the AAU CAOs in the sample*

Graduate Institution	n
University of California-Berkeley	17
Harvard University	17
Massachusetts Institute of Technology	13
Stanford University	12
Yale University	10
University of Chicago	7
University of Michigan-Ann Arbor	7
Princeton University	7
California Institute of Technology	6
University of California-Los Angeles	6
University of Illinois at Urbana-Champaign	6
Ohio State University-Main Campus	6
Purdue University-Main Campus	6

Figure 3. Bubble Chart of graduate institutions
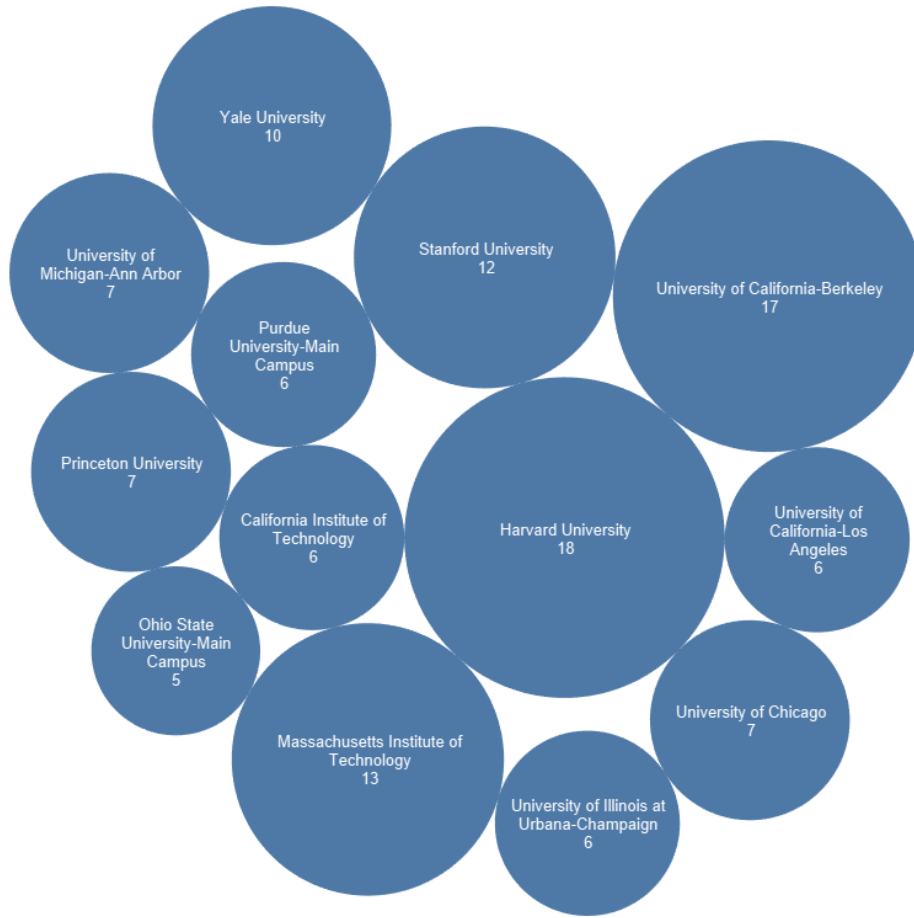
Among the AAU CAO's immediate prior institution of employment, University of Michigan (9) and Purdue University (9), followed by the University of Illinois at Urbana-Champaign (7) were the most common institutions (see Table 33 and Figure 4). Similarly, all of the institutions in Table 33, which represent the most common academic institution affiliations among the AAU CAOs in the sample, are R1 and AAU institutions.

Table 33. *Descriptive statistics of immediate prior institutions of employment of the AAU CAOs in the sample*

Immediate Prior Institution	n
University of Michigan-Ann Arbor	9
Purdue University-Main Campus	9
University of Illinois at Urbana-Champaign	7
Duke University	6
University of California-Davis	6
Stanford University	6

University of California-Irvine	6
University of Chicago	6
University of Arizona	6

Figure 4. Bubble Chart of institutions of previous employment

H[12]   *The AAU CAOs will have membership in multiple professional organizations, and there will be common affiliations among them*

The professional organizations that the AAU CAOs in the sample are affiliated with were collected from vitaes or professional biographies for 206 CAO's. A total of 688 professional organizations were recorded from these sources. The most common professional organizations among the CAOs in the sample can be found in Table 34. Of note, 59 of the CAOs in the sample are members of the American Association for the Advancement of Science (AAAS), 22 are

members of Phi Beta Kappa, and 20 are members of the American Academy of Arts and

Sciences. The average number of professional organizations each CAO is a member of was 4.49.

Table 34. *Descriptive Statistics: Professional organizations among the AAU CAOs*

Professional Organization	n
American Association for the Advancement of Science (AAAS)	59
Phi Beta Kappa	22
American Academy of Arts and Sciences	20
Institute of Electrical and Electronics Engineers (IEEE)	17
American Physical Society	16
Sigma Xi	15
National Academy of Sciences	14
American Psychological Association	13
American Chemical Society	12
American Society for Engineering Education (ASEE)	11
American Society of Mechanical Engineers	10
Association of American Universities (AAU)	10
National Academy of Engineering	9
Other	688

Figure 5 below displays the common professional organizations among the AAU CAOs in the

sample using a bubble chart visualization. The size of the bubbles indicates the proportion of

CAOs that are members of that particular organization compared to the other professional

organizations in the sample.

Figure 5. Common professional organizations among the AAU CAOs in the sample
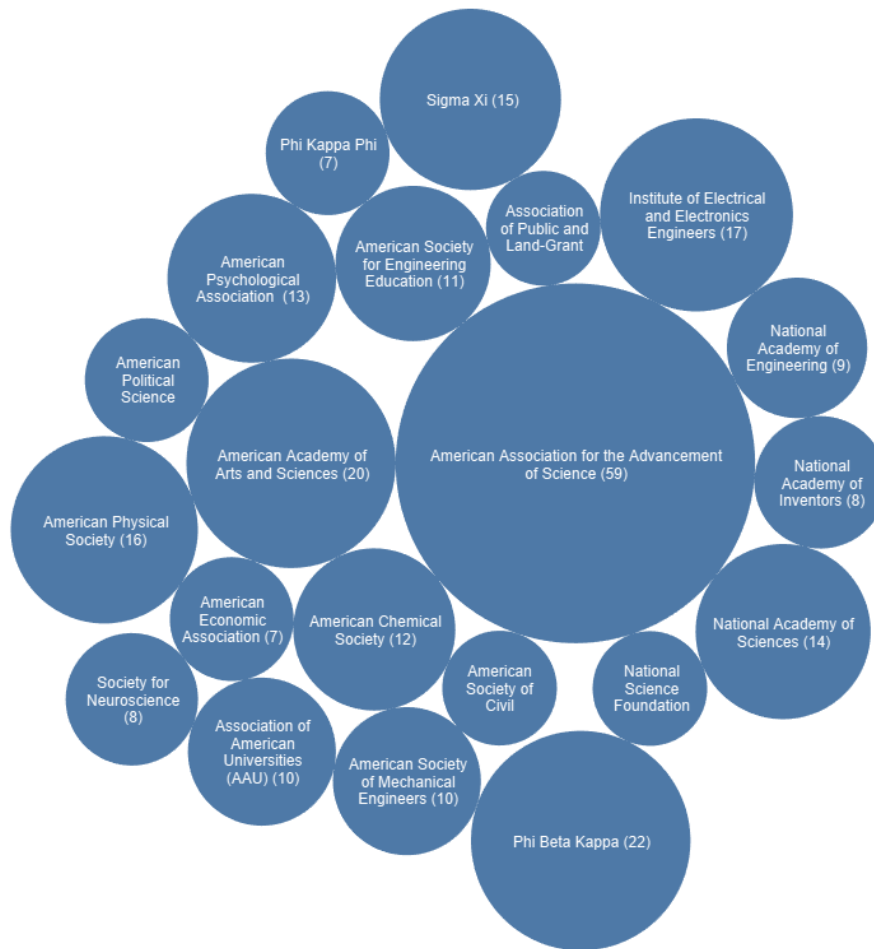
Summary

In this chapter three research questions and twelve hypotheses were analyzed using quantitative methods including descriptive statistics, t-tests for independent means, and chi-square analysis. The results of this data analysis were presented by research question and then hypothesis. The findings for each analysis were presented in the form of tables and figures throughout the chapter, and interpretations of the results of the analyses were also provided. While many of the results of the analyses were not statistically significant, there were significant gender differences observed in total number of research publications and status of discipline

using Biglan's (1973) Pure-Applied typology. In addition, several of my hypotheses were

supported by the null findings including prestige of academic institutions among the AAU CAOs

in the sample. Descriptive analyses also provided valuable insight into academic institution

affiliations and professional organization affiliations among the AAU CAOs in the sample. The

findings presented in this chapter are examined in greater detail in the next chapter.

Chapter Five

In this chapter I present a summary of this research study, discussion of the key findings and their relationship to the literature, implications for policy and practice, limitations of the research design, and directions for future research. Throughout this chapter I also expand upon the findings presented in chapter four to bring to light key forms of human capital, cultural capital, and social capital needed for the role of CAO at an AAU institution and gender differences that exist in these key forms of capital among the men and women CAOs of the AAU. I conclude this chapter by presenting the dominant archetype of an AAU CAO that emerged from the data and discussing the implications of this archetype for women's representation and full participation in this role.

Summary of the Study

The purpose of this study was to: (1) Identify key forms of human capital, cultural capital, and social capital among CAOs at the 61 research universities within the AAU, and (2) Examine if there are gender differences in these key forms of capital among the men and women AAU CAOs. Given the underrepresentation of women CAOs at the elite research universities, there is a need to better understand the qualifications, backgrounds, and experiences of CAOs (forms of human capital), as well as indicators of prestige (forms of cultural capital), and academic and professional affiliations that could reveal key professional networks among the AAU CAOs (forms of social capital). Differences in the various forms of capital of the men and women AAU CAOs are important to understand because they have implications for women's representation and full participation in this role in the future. However, little research has been conducted on the CAOs of research universities, or their accumulated forms of capital. Drawing on theories of human capital, cultural capital, and social capital, I crafted three research

questions to frame this research study. Guided by the literature on chief academic officers and the broader literature on faculty careers, I posited similarities and differences that might exist between men and women AAU CAOs.

To examine my research questions and hypotheses, I created a comprehensive database of publicly available information on the CAOs of the 61 AAU institutions from 2008 to June 2020 (n=230). I began by filling in missing data from a previous database June and Bauman (2019) constructed using similar methods. Given the time that elapsed between June and Bauman (2019)'s data collection and my own data collection, there had been turnover and new appointments among the CAOs of the AAU institutions. As a result, I collected this missing data. I then added to this dataset by collecting additional demographic data and data on key forms of capital collected from the curriculum vitaes or institutional webpages of each AAU CAO in my sample. This data collection resulted in a more comprehensive database that enabled the study of multiple measures of human capital, cultural capital, and social capital to examine my research questions. These measures of capital included *Prior experience, Academic careers, Disciplinary background, Hire type, Status of disciplines, Prestige of academic institutions* (undergraduate, graduate, and prior employment), *Research publications, H-index scores, Research grants, Academic institution affiliations,* and *Professional organization affiliations*.

I employed a combination of descriptive statistics, t-tests for independent means, and chi-square analyses to test my hypotheses. To ensure the trustworthiness of my data and analysis of the data, I conducted cross checks of the data against multiple sources, kept an audit trail of the sources and key decisions I made during data collection and analysis, and engaged in the peer review process through my dissertation committee. The findings I present in this chapter make a unique contribution to the literature on chief academic officers at research institutions and the

broader literature on women leader's career pathways in academia in three ways: (1) Bringing to light a strong archetype of what an AAU CAO is and the implications of this archetype for women's full participation in the role, (2) Identifying key forms of capital the CAOs of the AAU institutions have accumulated over the course of their academic careers to achieve this position, and (3) Highlighting gender differences that exist in the accumulated capital of the AAU CAOs and how these differences may be contributing to women's underrepresentation in this role.

Key Findings

This research study confirmed women's underrepresentation in the role of CAO at the nation's elite research institutions. From 2008 to June 2020, only 64 women have served in this key role at an AAU institution compared to 166 men. The results of this study also provided insight into key forms of capital among the AAU CAOs including tenure, disciplinary background, administrative experience, a scholarly record of research publications and grant awards, and affiliations with institutions of similar prestige. A strong archetype also emerged from the data. Among the AAU CAOs, the dominant form of a CAO is a tenured faculty member with a PhD in a non-STEM, yet high status discipline, a prestigious academic pedigree (as indicated by R1 and AAU status), and an impressive scholarly record of research publications and grant awards. The results of this study also reveal the most common pathway to the position of AAU CAO and key forms of capital accumulated along the way.

Regardless of gender, the most common pathway to CAO of an AAU institution is through the faculty ranks with previous experience serving a Dean anywhere from 1-4 years before appointment as CAO of an AAU institution. The majority of the AAU CAOs in the sample were hired internally and previously worked an institution of similar prestige (as indicated by R1 and AAU designation). The men and women AAU CAOs in this sample have an

impressive scholarly record, with a mean of 91 total research publications at their time of appointment to CAO and an average of 16.7 million dollars in research grant awards. The AAU CAOs are members of many different professional organizations, the most common among them being the American Association for the Advancement of Science, Phi Beta Kappa, and the American Academy of Arts and Sciences. The most common academic affiliations among the AAU CAOs are also widely considered to be the most prestigious institutions and include University of California- Berkeley, Harvard University, Stanford University, and Yale University. A total of 97 CAOs attended these academic institutions for their undergraduate and/or graduate education.

The existing literature on CAOs at research institutions suggests the AAU CAOs will be a white, male, tenured faculty member that has worked his way up through the administration, has a terminal degree in a STEM discipline, and was hired from within the institution (ACE, 2017; Johnson, 2017; June & Bauman, 2019). Thus, gender differences in accumulated forms of capital were likely to be observed given the existing research that finds women are less likely to achieve tenure (Bentley & Adamson, 2003; Perna, 2001; Smart, 1991), serve in academic leadership positions (Bain & Cummings, 2000; Conley, 2005; Hargens & Long, 2002) come from a STEM discipline (Carr, 2013; Stage & Hubbard, 2008), and work at research- intensive institution (Kulis, 1997; Marschke et al., 2007; Perna, 2001; Ward & Wolf-Wendel, 2004). This knowledge informed the 12 hypotheses I formed to guide this research study. Many of my hypotheses and subsequent analyses resulted in a null finding, which was somewhat surprising given that the dominant archetype is not reflective of many women in academia. However, there were some statistically significant gender differences observed regarding disciplinary

background and total number of research publications. I discuss the implications of these findings and offer suggestions for future research later in this chapter.

The findings of this research study also brought to light key forms of capital that have enabled men and women to become CAO of an AAU institution and offer guidance to aspiring AAU CAOs so that they can make strategic decisions to accumulate key forms of capital along their career. As discussed in previous chapters, women face many structural constraints and cumulative disadvantages which have implications for women's representation and full participation in the role of CAO at an AAU institution. Rather than expecting women to overcome these barriers and conform to the dominant archetype, institutions should recognize such barriers exist and take steps to break cycles of cumulative disadvantage and mitigate their impact upon women. I offer several recommendations for policy and practice institutions can enact to improve women's representation and full participation in the role of CAO of an AAU institution.

Research Question 1: What are key forms of human capital accumulated by CAOs of AAU institutions from 2008 to June 2020? 1a). What gender differences, if any, exist in the human capital of the CAOs of the AAU institutions?

Several measures of human capital were analyzed in this research study including *Prior experience,* as determined by the title of the immediate prior position each AAU CAO held prior to their appointment as an AAU CAO and the length of time spent in that position, *Academic career*, as determined by tenure status and length of time in academic career, *Terminal degree discipline* as determined by the CIP classification and STEM designation of the AAU CAO's terminal degree, and finally, *Hire type* (whether the AAU CAO was an internal or external hire). Four hypotheses grounded in the existing literature guided the examination of this research question.

H₁   *Men and women CAOs will have different prior experiences before their appointment as CAO of an AAU institution*

The most common immediate prior position held by the AAU CAOs in the sample was Dean (53%) followed by Vice Provost/ Deputy Provost (15%) or other academic administrator (16%). Men and women AAU CAOs in the sample were equally likely to have previously served as Dean of an academic unit prior to their appointment as CAO of an AAU institution. Among the AAU CAOs in the sample who were not a Dean, more women previously served as a Vice Provost/ Deputy Provost prior to their appointment as CAO of an AAU institution (22% compared to 12%), while men were more likely to have previously served in another academic administrative position (19% compared to 9%). However, the results of the chi-square analysis did not find these differences to be statistically significant.

The mean length of time the CAOs in the sample spent in their immediate prior position was 5 years before assuming the role of CAO at an AAU institution. While men spent slightly more time in their immediate prior position (5.4 years) compared to women (4.7 years), this difference was not statistically significant. Given these findings, I did not find support for my hypothesis that men and women CAOs will have different prior experiences before their appointment as CAO of an AAU institution. These findings suggest however, that serving as Dean of an academic unit for 5 years is a key form of human capital many AAU CAOs have acquired on their path to CAO of an AAU institution, and is a defining component of the dominant archetype.

This finding was somewhat surprising given the existing research on CAOs across institution types suggests women and men will have slightly different career trajectories on their path to CAO. According to the literature, women CAOs are more likely than men CAOs to have previous CAO or senior executive experience (42%), whereas men CAOs are more likely than

women CAOs to have previously served as an academic dean or in other administrative positions within academic affairs (29.4% compared to 27.6%) (ACE, 2013b, 2017; Johnson, 2017). My analysis of the data indicates men and women are equally likely to have previously served as a Dean prior to their appointment as CAO of an AAU institution. This difference in findings could be a result of the samples studied- the existing literature examined the previous positions of CAOs across different institution types. When only research universities are examined, as in this study, the majority of CAOs have previously served as Dean regardless of gender. It is possible the deanship acts as a signal to hiring committees that a candidate has the experience needed to advance into the role of CAO. Given that Deans have many of the same responsibilities as CAO (e.g., overseeing the budget of the academic unit, faculty hiring and tenure decisions, fundraising, etc.) such experience seems particularly relevant.

H$_2$ *The majority of AAU CAOs will be tenured faculty however, women will have longer academic careers before appointment to the role of CAO at an AAU institution compared to men AAU CAOs*

The majority of AAU CAOs in the sample are tenured faculty members (92%). This finding is fairly consistent across gender with 92% of the men CAOs and 94% of the women CAOs in the sample having attained the rank of full professor. As would be expected, the results of the chi-square analysis confirmed there is not a statistically significant difference in tenure status among the men and women AAU CAOs. This finding is also consistent with the literature- the CAO is often a tenured faculty member that has ascended through the faculty ranks and academic administration (Chilwniak, 1997; Kelly, 2011). My familiarity with the literature led me to posit that the majority of AAU CAOs would be tenured faculty, and the resulting analysis of my data confirm this hypothesis. This finding also suggests tenure is a key form of human capital for an AAU CAO to possess.

There was also no difference in the mean length of time between the men and women AAU CAO's first tenure-track faculty appointment and appointment as CAO of an AAU institution. The existing research on faculty careers suggests women faculty take longer to reach the rank of full professor (Britton, 2009, 2017; Johnson, 2017; Misra et al., 2011; Modern Language Association, 2009) and spend more time in their immediate prior position before becoming a CAO (McKenney & Cejda, 2000). While the women AAU CAOs had a slightly higher mean academic career (27.2 years) than the men AAU CAOs in the sample (26.9 years), this difference was very small and not statistically significant. Given these findings, I found only partial support for hypothesis H_2: the majority of the AAU CAOs are tenured faculty, but the women AAU CAOs did not have longer academic careers than the men AAU CAOs. Instead, the women AAU CAOs in the sample had academic careers that mirrored men more so than other women in academia. A study by O'Meara et al. (2019) supports these findings; STEM women full professors at the research institutions in the study had a slightly shorter average time to promotion from associate to full professor compared to their male counterparts. It is likely that the women AAU CAOs in this study strategically prioritized work time for research and thus achieved tenure at a similar rate as the men CAOs, and thus were able to successfully transition into academic leadership roles that would prepare them for the role of CAO at an AAU institution. Thus, these findings underscore the importance of tenure as a form of human capital for the position of CAO and bring to light another component of the dominant archetype that is an AAU CAO.

H_3 *Women AAU CAOs will have different academic backgrounds in terms of discipline of terminal degree than men AAU CAOs; More men AAU CAOs will have STEM backgrounds than women AAU CAOs*

The most common academic disciplines (as determined by CIP classifications of their terminal degrees) among the AAU CAOs in the sample were engineering (n=38; 17%), followed by physical sciences (n=34; 15%), social sciences (n=34; 15%), and biological and biomedical sciences (28; 12%). The women AAU CAOs were most concentrated in biological and biomedical sciences (n=11), social sciences (n=9), physical sciences (n=8), and psychology (n=7) while the men AAU CAOs were most highly concentrated in engineering (n=34), physical sciences (n=26), social sciences (n=25), and biological and biomedical sciences (n=17). While the overall model was statistically significant (p< .005), many of the individual cells had less than 5 observed counts, and thus the chi square test likely lacked sufficient power to detect real differences. Thus, this finding should be interpreted with caution which led me to determine that I could not with certainty conclude women AAU CAOs have different academic backgrounds in terms of the discipline of their terminal degree as was hypothesized.

The most common terminal degrees held by the AAU CAOs in the sample was a PhD in economics (n=13), followed by physics (n=11), electrical and electronics engineering (n=10), law (n=10), history (n=9), electrical engineering (n=8), and chemistry (n=7) and political science (n=7). While the observed counts of the individual disciplines were too small to conduct further analyses by gender, these results reveal interesting insights. The top three disciplines-economics, physics, and electrical engineering are among the most powerful, highly paid, and prestigious disciplines in academia. They bring prestige to the institution through research that attracts larger and a greater number of grant awards than other disciplines (Melguizo & Strober, 2007). Because grant awards are awarded through competitive processes (Stephan, 2012), research revenue through grant awards constitute a significant section of the prestige economy by conferring both money and status to the individual and the institution (Rosinger, Taylor, Coco

& Slaughter, 2016). Outside research funding is also factored into institutional ranking systems, further fueling the prestige economy. Thus, faculty from these disciplines may have a strategic advantage in the hiring process for administrative positions like Dean or CAO given their accumulated cultural capital in the form of demonstrated ability to bring in outside revenue and prestige to the institution.

I was able to examine gender differences in STEM designation among the AAU CAOs with greater confidence. Just over half of the AAU CAOs in the sample hold a terminal degree in a non-STEM discipline (54%). Interestingly, more than half of the women AAU CAOs hold a terminal degree in a STEM discipline (55%), while the majority of men AAU CAOs hold a terminal degree in a non-STEM discipline (57%). While descriptively a gender difference was observed, the results of the chi-square analysis indicate there was not a statistically significant difference between the percentages of men and women CAOs in the sample's terminal degree being designated as STEM. Thus, I did not find support for my hypothesis that men and women AAU CAOs will have different academic backgrounds in terms of discipline of terminal degree, or that more men CAOs will have STEM backgrounds than women CAOs.

Even though there was not a significant difference between the men and women AAU CAO's academic disciplines, it is worth noting that more than half (55%) of the women AAU CAOs in the sample have a terminal degree in a STEM discipline. However, the proportion of women with a background in STEM is not reflective of the general population of women faculty and administrators in academia. There is ample research documenting women's underrepresentation in the STEM fields (NSF, 2014, 2018; Xu, 2008) and that these fields can be unwelcoming or even hostile towards women (Britton, 2017; Glass & Minnotte, 2010; Maranto & Griffin, 2011; Rincón & George-Jackson, 2016; Walton, Logel, Peach, Spencer & Zanna,

2015). Women in the STEM disciplines also face many other challenges and barriers to their

success and often have to adopt male-centered career models in order to achieve career success.

Male-centered career models reward hyperachievement and total work commitment, to the

exclusion of outside life commitments (Etzkowitz et al., 1994; Kemelgor & Etzkowitz, 2001).

Having an academic background in a STEM field and adopting to a male-centered career model

may have given these women a strategic advantage in the hiring process compared to women

candidates with other academic backgrounds. For instance, these women may have a greater

number of research publications and research grants, forms of cultural capital important for the

role of CAO at an AAU institution given the strong research focus of these institutions. It is well

documented in the literature that faculty in the STEM disciplines tend to have a greater number

of publications, grants, and commitment to scholarly activities relative to faculty in other

academic disciplines (Melguizo & Strober, 2007; Xu, 2012). In addition, background in a STEM

discipline may signal greater credibility, competence, and brilliance given the eminence of

STEM disciplines within the academic hierarchy. The ability to signal credibility, competence,

and brilliance may be a more important factor for women than men during the hiring process for

a CAO position. Research on faculty and academic hiring finds men often do not have to exhibit

the same degree of competence as women being considered for the same position (Eaton,

Saunders, Jacobson & West, 2019; Foschi, 2000). Thus, having a background in a STEM

discipline may be a strategic advantage for women aspiring to the role of CAO at an AAU

institution. Unfortunately, male-centered career models within many STEM disciplines support

structural constraints against women faculty and contribute to field segregation and a lack of

critical mass in many disciplines, which in turn perpetuates the underrepresentation of women in

male-dominated fields and academic leadership (Etzkowitz et al., 1994).

H$_4$ *More women AAU CAOs will be internal hires than men AAU CAOs*

The extant literature on CAOs across institution types suggests women CAOs are less likely to serve at multiple institutions on their pathway to becoming CAOs, and are more likely to be promoted within their institutions into other administrative positions compared to men CAOs (ACE, 2009, 2013; Kelly, 2011). These findings informed my hypothesis that more women AAU CAOs will be internal hires compared to men AAU CAOs. While the majority of the AAU CAOs in the sample were internal hires (69%), only 59% of the women AAU CAOs were internal hires compared to 72% of the men AAU CAOs. Despite this difference in hire type among the men and women AAU CAOs in the sample, the results of the chi-square analysis indicate this difference is not significant enough to conclude there is a difference in hire type between the men and women AAU CAOs in the sample. Given this finding, I did not find support for hypothesis H$_4$. Instead, the data indicate a preference for candidates within the institution, regardless of gender and thus, provide an additional component that defines the dominant archetype of an AAU CAO.

However, a preference for internal candidates could be negatively impacting women and contributing to their underrepresentation as CAO of an AAU institution. There is a tendency for hiring committees to more heavily scrutinize the performance record of internal candidates compared to external candidates given that the committee has greater insight into the internal candidate's job performance (Birnbaum, 1988; DeVaro, Kauhanen & Valmari, 2019). In addition, implicit bias in the hiring process may compound the effects of such scrutiny. Women have to demonstrate a higher level of competence than an equally qualified man (Avolio, Gardner, Valian, 2005; Eagly & Carli, 2007; Heilman, Wallen, Fuchs & Tamkins, 2004; Walumbwa, Luthans & May, 2004), and tend to be more heavily scrutinized during the hiring

process regardless of hire type (Leslie, Cimpian, Meyer & Freeland, 2015; Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2012; Phelan, Moss-Racusin & Rudman, 2008; Pitts, 2017). Women of color who are hired into faculty or senior leadership positions in academia report experiencing even greater scrutiny than white women concerning their experience and credentials (Hannum, Muhly, Shockley-Zalabak & White, 2014; Turner, Myers & Creswell, 1999). Thus, implicit bias and greater scrutiny of past performance of women internal candidates could be resulting in less women internal hires.

Research Question 2: What are key forms of cultural capital accumulated by CAOs of the AAU institutions from 2008 to June 2020? 2a). What gender differences, if any, exist in the cultural capital of the CAOs of the AAU institutions?

Several measures of key forms of cultural capital were analyzed including *Prestige of undergraduate institution* as determined by AAU, Ivy League, and Carnegie Classification (R1) status, *Prestige of graduate institution* as determined by AAU, Ivy League, and Carnegie Classification (R1) status, *Prestige of immediate prior institution of employment* as determined by AAU, Ivy League, and Carnegie Classification (R1) status, *Status of discipline* as determined by Biglan's typology of Hard-Soft and Pure-Applied disciplines, *Research publications* as determined by total number of publications, total number of first author publications, and total number of co-authored publications, *h-index score*, as determined by Google Scholar's h-index score listed for each AAU CAO, and finally, *Research grants* as determined by the total number of research grant awards and the total award value of all research grants among the AAU CAOs in the sample.

H$_5$ *Men AAU CAOs are more likely than women AAU CAOs to have graduated from prestigious institutions as indicated by membership in the AAU, membership in the Ivy League, and R1 Carnegie classification*

Both men and women CAOs of the AAU institutions were equally likely to have graduated from a prestigious undergraduate institution. The higher education literature on institutional prestige commonly uses AAU affiliation and R1 status (Ali, Bhattacharyya & Olejniczak, 2010; Eshelman et al., 2000; Fairweather, 2002; Liebert, 1976), as well as membership in the Ivy League (Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013), as indicators of prestige within academia. While the majority of the CAOs in the sample did not attend an Ivy League institution, 48% graduated from an AAU institution and more than 60% graduated from an R1 undergraduate institution. Results of the chi-square analysis indicate there was no significant difference between the percentages of men and women CAOs in the sample's prestige of their undergraduate institution as indicated by AAU, R1, or Ivy League status. Given these findings, I found that men and women were equally likely to have graduated from prestigious undergraduate institutions as indicated by R1 status.

Regarding graduate institutions, the findings were more definitive. Both men and women CAOs of the AAU institutions were equally likely to have graduated from a prestigious graduate institution as indicated by AAU and R1 status. 84% of the AAU CAOs went to an AAU institution, and 92% went to an R1 graduate institution for their graduate education. The majority of the CAOs in the sample also attended an Ivy League institution (76%) for their graduate education. These findings were consistent for both men and women AAU CAOs in the sample. Given these findings, I found men and women were equally likely to have graduated from prestigious graduate institutions.

It is well known that there is a prestige-based hierarchy within academia that reinforces a prestige economy (Coate & Kandiko Howson, 2016; Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013). According to Oprisko and colleagues (2013), PhD graduates in particular enjoy a

significant professional benefit from affiliation with the prestigious departments and universities from which they graduate. This is because of a network-based system of affiliation where graduates of elite institutions have access to educational paths that set them up for greater career success than graduates from less-prestigious programs (Oprisko, Dobbs & DiGrazia, 2013). The prestige economy is especially evident among faculty hiring networks; 25% of institutions produce between 71-86% of tenure track faculty at top computer science, business, and history departments (Clauset, 2015). In sociology, graduates of the top 20 sociology PhD programs comprise almost 70% of faculty at top sociology departments- all of which are at AAU institutions (Burris, 2004). A similar effect has been observed at the institution level. The eminence or prestige of a university creates a "halo effect" that bolsters the status of departments that are located within prestigious universities (Burris, 2004). For instance, Long, Allison and McGinnis (1993) found within biochemistry, the prestige of the candidate's PhD granting institution had a significant and substantial effect on the prestige of the institutions where the candidate was subsequently employed. Thus, the prestige of one's academic affiliations serves as an important form of cultural capital within academia. Not only do institutions seek to maintain their prestige by accepting students and hiring faculty from other equally prestigious institutions, but institutional prestige is a highly valued form of cultural capital for the individual as well. Among faculty, institutional prestige signals the potential that the faculty candidate will be highly productive scholar and thus improves their chances of being hired at another prestigious institution (Burris, 2004).

The prestige of one's academic pedigree is likely just as important at the CAO level. Both men and women AAU CAOs in the sample have prestigious academic backgrounds as evidenced by their undergraduate and graduate academic institution affiliations. Such prestigious

affiliations may signal academic accomplishment, provide a network of other accomplished

individuals in which career sponsorship can be drawn from, and serve as a gateway for

consideration for the role of CAO at an AAU institution given the tendency for hiring

committees to select individuals with the same or similar academic backgrounds (Oprisko,

Dobbs & DiGrazia, 2013). Taken together, these findings suggest prestigious academic

institution affiliations are a key form of cultural capital for an AAU CAO to possess and a

defining component of the archetype of an AAU CAO. This is not to say that an individual who

did not attend an AAU or Ivy League institution for undergraduate or graduate school cannot

become an AAU CAO. The prestige of one's immediate prior institution of employment is also

an important factor and this decision can be more strategic as decisions around employment

opportunities occurs later in one's academic career.

H_6 *Men AAU CAOs are more likely than women AAU CAOs to have previously*
        worked at a prestigious institution as indicated by membership in the AAU,
        membership in the Ivy League, and R1 Carnegie classification

Like their undergraduate and graduate institution affiliations, the majority of the AAU

CAOs in the sample previously worked at an institution of similar prestige prior to assuming the

role of CAO at an AAU institution. The majority of the AAU CAOs worked at an AAU

institution in their previous position of employment (92% of men and 89% of women), and

almost 96% previously worked at an R1 institution prior to assuming the role of CAO at an AAU

institution. Only 9% of the AAU CAOs previously worked at an Ivy League institution. Results

of the chi-square analysis indicate there is no significant difference between the percentages of

men and women CAOs in the sample's prestige of their immediate prior institution of

employment as indicated by AAU, R1, or Ivy League status. Given these findings, I found both

men and women AAU CAOs are equally likely to have previously worked at a prestigious

136

institution prior to their current appointment as CAO of an AAU institution as indicated by AAU and R1 status.

As previously discussed, a prestige-based hierarchy exists in academia. According to the literature, elite colleges and universities tend to preserve and improve their reputations by hiring from each other (Burris, 2004; Kennedy, 1997; Oprisko, Dobbs & DiGrazia, 2013). Faculty that work in prestigious departments or institutions are, "expected to possess sufficient human and cultural capital to demonstrate virtuosity in those fields of performance that define the academic life: research, publishing, and lecturing, for example" (Burris, 2004, p. 246). Given that the AAU is comprised of an elite set of research institutions it follows that hiring committees would demonstrate a preference for a candidate with previous experience at the same institution type and level of prestige. Thus, the importance of institutional prestige in faculty hiring and expectations for faculty performance suggests institutional prestige may also be an important form of capital in the hiring process for CAO of an AAU institution.

H7   *Women AAU CAOs will be concentrated in "lower status" disciplines compared to men AAU CAOs as indicated by Biglan's (1973) typology of Hard-Soft and Pure-Applied disciplines*

Using Biglan's typology of Hard-Soft and Pure-Applied disciplines (see Appendix D for typology and full list of categorizations) the disciplines of the CAO's terminal degrees in the sample were categorized into 212 CIP categories and assigned a rating on a scale of 1 to 4 with 1= Hard and 4=Soft to determine whether women AAU CAOs are more highly concentrated in "lower status" disciplines compared to men AAU CAOs. According to the literature, Hard knowledge domains are regarded more highly, or considered more prestigious, than Soft domains (Becher & Trowler, 2001; Gardner, 2013; MacMynowski, 2007). This is because Hard disciplines have well-established research paradigms that involve universal laws and theories and

137

causal propositions that result in objective and generalizable findings (Biglan, 1973). Examples

of Hard disciplines include the physical sciences and mathematics which also tend to be male-

dominated (Knobloch-Westerwick, Glynn & Huge, 2013; Melguizo & Strober, 2007). Soft

disciplines on the other hand have less consensus around what constitutes well-developed theory

and universal laws, and research findings tend to be more subjective, and less causal and

generalizable. Soft disciplines include the humanities and education, where women tend to be

most heavily concentrated (Melguizo & Strober, 2007). Deeply established norms among

academics creates a disciplinary hierarchy in which the objectivity of Hard disciplines is

considered more rigorous and valid than softer disciplines, and thus Hard disciplines have greater

power, authority, and status (MacMynowski, 2007). Knowing women are more highly

represented in Soft disciplines, I posited that women AAU CAOs would be concentrated in

"lower status", soft disciplines compared to men AAU CAOs as indicated by Biglan's (1973)

typology of Hard-Soft disciplines. While almost half (46%) of the men AAU CAOs hold a

terminal degree in a Hard discipline compared to 36% of the women AAU CAOs, this difference

was not found to be statistically significant. Thus, I did not find support for hypothesis H[7];

women AAU CAOs are not more likely than men AAU CAOs to come from "lower status"

disciplines as determined by Biglan's Hard-Soft typology. Instead, men and women AAU CAOs

were equally likely to come from "higher status", Hard disciplines as evidenced by this null

finding and that 54% of the AAU CAOs in the sample hold a terminal degree in a Hard or

Somewhat Hard discipline.

I also examined the Pure-Applied dimension of Biglan's (1973) typology to determine

whether women AAU CAOs are more highly concentrated in "lower status", Applied disciplines

compared to men AAU CAOs. Like Hard disciplines, Pure disciplines are considered higher in

status or prestige compared to Applied disciplines. Pure disciplines are described as self-regulating and not directly applied to the professions or problems in the outside world (Biglan, 1973). Examples of pure disciplines include the physical sciences and mathematics. Applied disciplines are regulated by external influence and examine more applied problems as a result of their professionalization (Biglan, 1973). Examples of Applied disciplines include engineering, accounting, and finance. The physical sciences and mathematics comprise the Pure dimension, and as stated previously, tend to be male-dominated. For this reason, I posited that women AAU CAOs would be concentrated in "lower status", Applied disciplines compared to men AAU CAOs as indicated by Biglan's (1973) typology of Pure-Applied disciplines. To examine hypothesis H_7, I categorized the CAO's terminal degree disciplines into 212 CIP categorizations and assigned a rating on a scale of 1 to 4 with 1= Pure and 4=Applied. Among the CAOs in the sample, the greatest number of terminal degrees were categorized as Somewhat Pure (36%). The women CAOs in the sample had a slightly higher proportion of terminal degrees in a Somewhat Pure discipline (45%) compared to the men CAOs (32%). While neither men nor women were more likely to hold a terminal degree in a Pure or Applied discipline, women CAOs were significantly less likely to hold a terminal degree in a Somewhat Applied discipline compared to the men CAOs in the sample (16% compared to 40%, respectively). Given these findings, I did not find support for hypothesis H_7 that women AAU CAOs would be more highly concentrated in "lower status" disciplines, or Applied disciplines, compared to men AAU CAOs. Instead, men and women AAU CAOs were equally likely to hold a terminal degree in a "higher status" discipline as indicated by the high proportion of AAU CAOs with terminal degrees in a Pure or Somewhat Pure discipline (63%).

In unpacking the meaning of these findings, the importance of disciplinary status as a

form of cultural capital and the strength of the archetype of an AAU CAO is emphasized.

Regardless of gender, AAU CAOs largely come from "high status" disciplines. Pure disciplines

are considered higher in status and garner more respect in the academic community which may

give women in these disciplines an advantage in the selection process for CAO. However,

women tend to be underrepresented in many of the Pure disciplines such as the physical sciences

and mathematics. Women are more highly represented in education, arts and humanities

(Melguizo & Strober, 2007) which may be contributing to women's underrepresentation in the

role of CAO. These findings also underscore a gender disparity that exists; men can come from

more Applied fields without a penalty. This may be because they are most concentrated in

engineering fields which bring in large and numerous grant awards which may counteract the

Applied field status (Becher & Trowler, 2001). While women in engineering may receive these

same benefits, women tend to be greatly underrepresented in the engineering fields (NSF, 2014,

2018) and thus are less likely to amass this benefit.

> H_8 *Men AAU CAOs will have a greater number of research publications including more single-author and co-authored research publications than women AAU CAOs*

The results of the chi-square analyses supported my hypothesis that men AAU CAOs will

have a greater number of research publications including more single-author and co-authored

research publications than women AAU CAOs. The mean total number of research publications

was significantly higher for the men AAU CAOs (91) compared to the women AAU CAO's

(59). Similarly, the men AAU CAO's mean total number of first-author research publications

(22) was significantly higher than the women AAU CAO's mean number of first-author research

publications (15), and the men AAU CAO's mean total number of co-authored research

publications (66) was also significantly higher than the women AAU CAO's mean number of co-authored research publications (41).

At face value, these results are unsurprising given the literature on faculty careers that finds men faculty tend to publish more than women faculty (Cole & Zuckerman, 1984; Hagedorn, 2001; Park, 1996; Sax et al., 2002; Sheridan et al., 2017) and are first-author on research publications more often (Lerback & Hanson, 2017). Workload inequities and the tendency for women faculty to spend more time on teaching and service activities, results in less time for research and other scholarly pursuits that are more highly valued in academic reward systems (Link, Swann & Bozeman, 2008; Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva & Nyunt, 2017) and serve as indicators of prestige, or cultural capital (Blackmore & Kandiko, 2011; Coate & Kandiko Howson, 2016). Increased time spent on service activities in particular has been correlated with lower research productivity, differential career progress, and decreased satisfaction with workload and faculty careers among women (Aguirre, 2000; Bellas & Toutkoushian, 1999; Carrigan, Quinn & Riskin, 2011; Link, Swann & Bozemann, 2008; Misra et al., 2011; Park, 1996). Thus, the tendency for women to have less research publications and first-author publications during their faculty career may be contributing to their underrepresentation at the CAO level. A lack of cultural capital, in the form of research publications, coupled with a tendency to spend more time on teaching and service, contributes to a cumulative cycle of disadvantage for women in academia (Coate & Kandiko Howson, 2016). Without such capital, women are less likely to be promoted and granted tenure which in turn creates a smaller pool of women candidates qualified for the position of CAO at an AAU institution.

When we consider these results in relation to the lack of gender differences observed in all other forms of capital examined in this research study, these results become somewhat surprising. The observed difference in total number of research publications is likely not due to disciplinary differences in publication rates given that the men and women AAU CAOs were largely concentrated in the same academic disciplines (with the exception of engineering). The women AAU CAOs were most highly concentrated in biological and biomedical sciences (n=11), social sciences (n=9), physical sciences (n=8), and psychology (n=7) while the men AAU CAOs were most highly concentrated in engineering (n=34), physical sciences (n=26), social sciences (n=25), and biological and biomedical sciences (n=17). Faculty in Hard disciplines tend to have higher publication rates than Soft disciplines (Shin & Cummings, 2010). Among the disciplines the AAU CAOs in the sample are most highly concentrated in, women tend to publish fewer journal articles overall and receive fewer citations per publication than men, on average (Aguinis, Ji & Joo, 2018; Weisshaar, 2017).

Despite this observed difference in total number of research publications among the men and women AAU CAOs in the sample, these women were able to achieve the position of CAO at an AAU institution. It is possible that the total number of research publications is not as important as other forms of capital at the CAO level such as tenure or previous experience. Hiring committees may assume that a CAO candidate with tenure has an impressive scholarly record, otherwise that candidate would likely not have achieved tenure. As a result, the actual number of research publications is likely not taken into account during the hiring process at the level of CAO.

H$_9$ *Men AAU CAOs will have higher h-index score than women AAU CAOs*

It is important to note that I was only able to find the h-index scores for 80 of the 230 AAU CAOs. As a result, my findings could be a result of the low sample size and should be interpreted with caution. Given that men tend to have a greater number of research publications and are more highly concentrated in Hard disciplines where research findings are more generalizable and thus may be cited by other researchers more often than those in other disciplines (Hirsch, 2005), I hypothesized men are likely to have higher h indices than women AAU CAOs. The mean h- index score among all of the AAU CAOs in the sample was 48.98. Men had a slightly higher mean h-index score (49.90) than the women AAU CAOs (46.38) however, this difference was not statistically significant. According to Hirsch (2005), an h-index score of 12 is good enough to secure university tenure, a h-index score of 20 is considered a sign of academic success, and a h-index score of 40 is, "a marker of an outstanding scientist likely only to be found at major research institutions" (Hirsch, 2005, p.16571). For added context, the average h-index of the National Association of Science (NAS) fellows in 2005 was 45. Both the men and women AAU CAOs in the sample had an average h-index score above this. Thus, the AAU CAOs within this sample are a highly cited group of individuals- a measure of both research productivity and impact on the field. These findings suggest demonstrated research productivity and impact upon one's field may be an important form of cultural capital for an AAU to possess.

It is important to note h-index scores vary by academic discipline. According to Hirsch (2005), differences among academic disciplines' productivity and citation practices results in inter-field differences in typical h values. For instance, biology, physics and chemistry researchers tend to have the highest median h-index values (31 or 32), while faculty in mathematics have one of the lowest median h-index values (12). Engineering disciplines have a

wide range of citation characteristics and thus have a median h-index score of 10–19. Given these differences across fields, the h-index should not be used to compare faculty from different disciplines. Unfortunately, due to the small sample size, I was not able to examine h-index scores by discipline.

Aside from the impact of a small sample size, the lack of an observed difference between h-index scores of men and women AAU CAOs could be due to the types of field differences noted above. The men AAU CAOs in the sample were most heavily concentrated in the engineering fields which have a median h-index score of 10-19. Faculty in the biological and biomedical sciences, which comprise the greatest proportion of women AAU CAOs in the sample, tend to have much higher median h-index score. Among 36 new inductees in the NAS in biological and biomedical sciences in 2005, the average h-index score was 57. Thus, the concentration of women AAU CAOs in biological and biomedical sciences could be driving the average h-index score among the women AAU CAOs up, while the high concentration of men AAU CAOs in engineering could be driving the average h-index score for the men AAU CAOs down resulting in similar average h-index scores among the men and women AAU CAOs in the sample. It is also possible that both the men and women AAU CAOs in the sample have achieved a very high level of research productivity and success in their fields, resulting in the lack of gender difference observed.

H_{10} *Men AAU CAOs will have greater total number of research grants and a greater mean total dollar amount of research grants than women AAU CAOs*

Women tend to be concentrated in academic disciplines where grant funding is not as abundant as it is in the STEM fields, or more Applied fields like engineering or economics (Melguizo & Strober, 2007; Rosinger, Taylor, Coco & Slaughter, 2016). Previous research

suggests the number of publications and citations individuals have accumulated has a significant positive impact on the dollar amount of grants that individual is awarded (Ali, Bhattacharyya & Olejniczak, 2010). Within this sample, the men AAU CAOs were most concentrated in engineering fields (n=34), whereas there were only 4 women with an engineering background. As a result, the women AAU CAOs in this sample may have had more difficulty securing a greater number of research grants compared to their male counterparts in engineering fields. Given my findings that men AAU CAOs have on average, a greater number of publications compared to women AAU CAOs, it follows that they would have a greater total number of and total award value of research grants. Such evidence supports the rationale behind hypothesis H_{10}, that men AAU CAOs will have a greater mean total number of and total dollar amount of research grants compared to women AAU CAOs.

The mean total number of research grants among the AAU CAOs was 14.05. Women actually had a slightly higher mean total number of research grants (14.29) compared to the men AAU CAOs (13.93). This difference was not statistically significant, however. Among all of the AAU CAOs in the sample, the mean total award value in research grants was approximately 16.7 million dollars. The men AAU CAOs had a slightly higher mean award value than the women AAU CAOs (17.6 million and 14.6 million, respectively). However, this difference was also not statistically significant. As a result, I did not find support for my hypothesis that men AAU CAOs will have a greater mean total number of and total dollar amount of research grants compared to women AAU CAOs despite significant differences in total number of research publications. However, these findings do suggest that a strong record of obtaining research grants may be an important form of capital for all AAU CAO candidates to demonstrate.

Bringing in outside research funding through grants allows faculty and academic administrators to build 'empires' on campuses and climb the administration ladder; "Department chairs grow their department then leave to become deans. Deans implement and operationalise strategy and policy for their gain to become provosts" (Callier, Singiser & Vanderford, 2015, p.15). As stated previously, CAOs are charged with overseeing the research agenda of the institution. Large grant awards are highly valued at research institutions in particular; they bring prestige to the researcher and to their institution because of the attention and revenue they bring into the university to pay for the research mission (Callier, Singiser & Vanderford, 2015). Thus, evidence of securing grant funding and managing large-scale research grants may signal to hiring committees that that candidate will be able to bring additional funding and prestige to the institution in the role of CAO. Given the relationship between research grants and prestige (Ali, Bhattacharyya & Olejniczak, 2010; Burris, 2004), demonstrated success in acquiring this form of capital seems especially important for the role of CAO. My findings indicate the AAU CAOs in the sample, regardless of gender, were extremely successful in acquiring competitive grant funding throughout their academic careers. Thus, these findings also bring to light an additional component of the dominant archetype of an AAU CAO- evidence of strong research funding.

It is also worth noting that the lack of a gender difference in total number of grant awards and total dollar amount of research grants may be related to the previous findings of this research study. Unlike the general population of women in academia, more than half of the women AAU CAOs in the sample come from STEM disciplines where research grants are more abundant. Furthermore, the women AAU CAOs in the sample were most highly concentrated in the biological and biomedical sciences and physical sciences. Faculty in these two disciplines in particular are more likely to secure grants of higher dollar value compared to faculty in other

fields (Ali, Bhattacharyya & Olejniczak, 2010). As a result, the women AAU CAOs in the sample were able to secure about the same number of research grants and total award amount of research grants as the men AAU CAOs. The men and women AAU CAOs in the sample were also equally likely to have affiliations with AAU institutions. Institutional reputation has a substantial effect on the dollar amount of research grants a researcher receives. Ali and colleagues (2010) found being at an AAU member institution contributes positively to the probability of securing large research grants. Given that an overwhelming majority of the AAU CAOs were affiliated with AAU institutions, it would follow that their likelihood of securing grant funding would be similar. Unfortunately, the disciplinary backgrounds and affiliations with AAU institutions the women AAU CAO's in the sample possess are not necessarily representative of the broader population of women in academia. As a result, this aspect of the dominant archetype- strong evidence of research funding- may put women who are in disciplines where grant funding is not as abundant (e.g., English or History), or who are not at research intensive institutions, at a disadvantage when it comes to securing this key form of capital.

Research Question 3: What are key forms of social capital accumulated by CAOs of AAU institutions from 2008 to June 2020? Do any common professional affiliations emerge among the AAU CAOs in this study?

H$_{11}$ *The AAU CAOs will have multiple academic institution affiliations, and there will be common affiliations among them*

The most common undergraduate institution among the AAU CAOs in the sample was Harvard University (n=10) followed by University of California-Berkeley (n=8) and Cornell University (n=7) (see Table 32). Similarly, the most common graduate institutions among the AAU CAOs in the sample were Harvard University (n=17) and University of California-Berkeley (n=17), followed by Massachusetts Institute of Technology (n=13) (see Table 33). As

147

noted previously, the most common graduate academic institution affiliations among the AAU CAOs in the sample are R1 and AAU institutions. When the undergraduate and graduate academic institution affiliations are examined together, Harvard (n=28), UC-Berkeley (n=25) Stanford (n=17) and Yale (n=16) have produced the greatest number of AAU CAOs from 2008 to June 2020 (See Figure 6). My analysis of the data also revealed that the majority of the AAU CAOs in the sample had multiple academic institution affiliations. More than 70% of the AAU CAOs in the sample had at least three different academic institution affiliations (as indicated by undergraduate, graduate, and immediate prior institution of employment). Only 3% of the AAU CAOs in the sample have only one institution affiliation. Thus, I found support for hypothesis H_{11} that the AAU CAOs have multiple institution affiliations and there are common affiliations among them.

Figure 6. Bubble chart of common academic institutions among the AAU CAOs
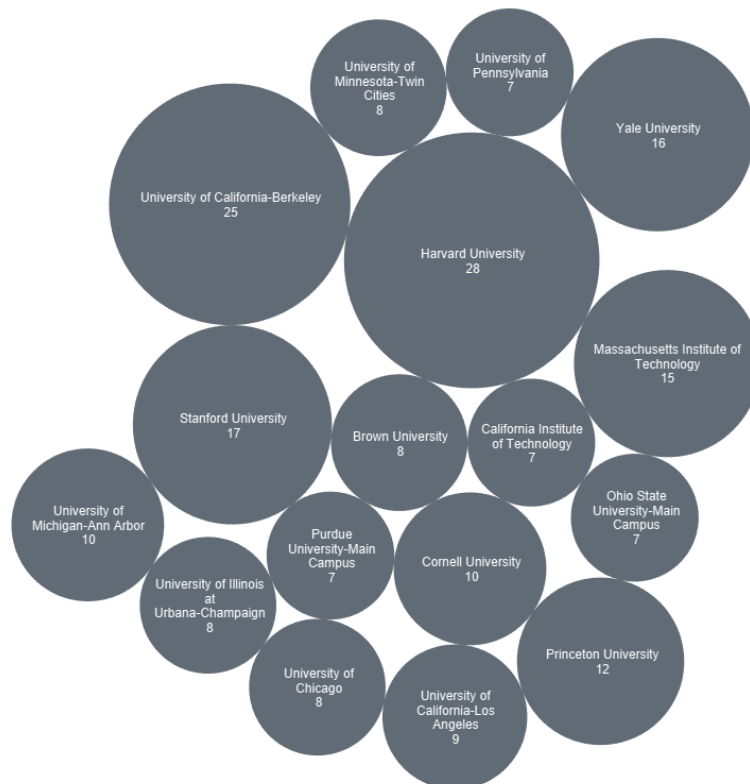
These findings are significant because they reveal a network-based system of affiliation whereby alumni obtain significant professional benefits. As stated previously, graduates of elite institutions have access to educational paths that will allow them to succeed because they are better situated than graduates from less-prestigious programs (Oprisko, Dobbs & DiGrazia, 2013). The Ivy League and AAU institutions are among the most prestigious academic institutions and have greater access to resources like research facilities and future employment opportunities. The prestige of the department and institution in which an academic received their PhD consistently ranks as the most important factor in determining the employment opportunities available to those entering the academic labor market (Burris, 2004; Oprisko, Dobbs & DiGrazia, 2013).

Among the AAU CAO's immediate prior institution of employment, University of Michigan (n=9) and Purdue University (n=9), followed by the University of Illinois at Urbana-Champaign (n=7) were the most common academic institutions of employment among the AAU CAOs in the sample (see Table 34)- all of which are R1 and AAU institutions. Overall, this examination of academic affiliations among the AAU CAOs suggests affiliations with prestigious institutions is an important form of social capital for an AAU CAO to possess. The proportion of AAU CAOs that are affiliated with prestigious academic institutions suggests this component of the archetype is not an optional form of social capital for a future AAU CAO. Affiliations with prestigious academic institutions likely influences future employment opportunities at an AAU institution. Academics who secure employment in the more prestigious departments and institutions gain differential access to resources and rewards that enhance their prospects for subsequent career recognition and success (Burris, 2004), and a prestige economy encourages prestigious institutions to hire from one another (Coate & Kandiko Howson, 2016;

149

Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013). In addition, search committees and hiring

committees often use their alma mater, or other academic affiliations, as a tool to weed out other

candidates for consideration (Oprisko, Dobbs & DiGrazia, 2013). Thus, having a prestigious

academic pedigree, especially one with multiple AAU institution affiliations is an important

form of social capital for a future AAU CAO to possess.

H$_{12}$ *The AAU CAOs will have membership in multiple professional organizations, and*
          there will be common professional organization affiliations among them

A total of 688 professional organizations were recorded from the vitaes and professional

biographies for 206 of the AAU CAO's in the sample. The bubble chart below (see Figure 7)

depicts the most common professional organization affiliations among these AAU CAOs. 59 of

the AAU CAOs are members of the American Association for the Advancement of Science

(AAAS), 22 are members of Phi Beta Kappa, and 20 are members of the American Academy of

Arts and Sciences. The average number of professional organizations each CAO is affiliated with

was 4.49. There was no difference in the average number of professional affiliations among the

men and women AAU CAOs in the sample. Thus, I found support for hypothesis H$_{12}$ in that the

AAU CAOs are members of multiple professional organizations and there are common

affiliations among them.

Similar to the findings for academic institution affiliations, these findings suggest another

potential affiliation-based network that professional organizations offer its members.

Professional networks are a form of social capital, and network connections build other forms of

social capital by providing access to information, influence, resources, and career sponsorship

(Christakis & Fowler, 2009; Ibarra & Deshpande, 2004; Ibarra et al., 2005; Lin, 1999; Niehaus &

O'Meara, 2015; Seibert et al., 2001). The value of the social capital membership in a

professional organization provides is proportionate to the exclusiveness of the group (Bourdieu, 1986). Members of the National Academy of Sciences (NAS) for instance, must be elected into the organization based upon a record of outstanding scientific achievement. As such, membership in the NAS is considered a high honor among researchers. Fourteen of the AAU CAOs in the sample are elected members of this elite network of researchers. Membership in organizations such as the NAS create networks that these AAU CAOs may have leveraged in their academic career including during the job search and hiring process for the position of CAO at an AAU institution. The prestige hierarchy in academia often elevates "affiliated honor", or excellence granted based upon membership in professional organizations or societies during hiring decisions (Oprisko, 2012). Thus, it is likely that membership in several professional organizations, and prestigious ones at that, is a strategic form of social capital future AAU CAOs can leverage during the hiring process.

Figure 7. Bubble chart of common professional organizations among the AAU CAOs
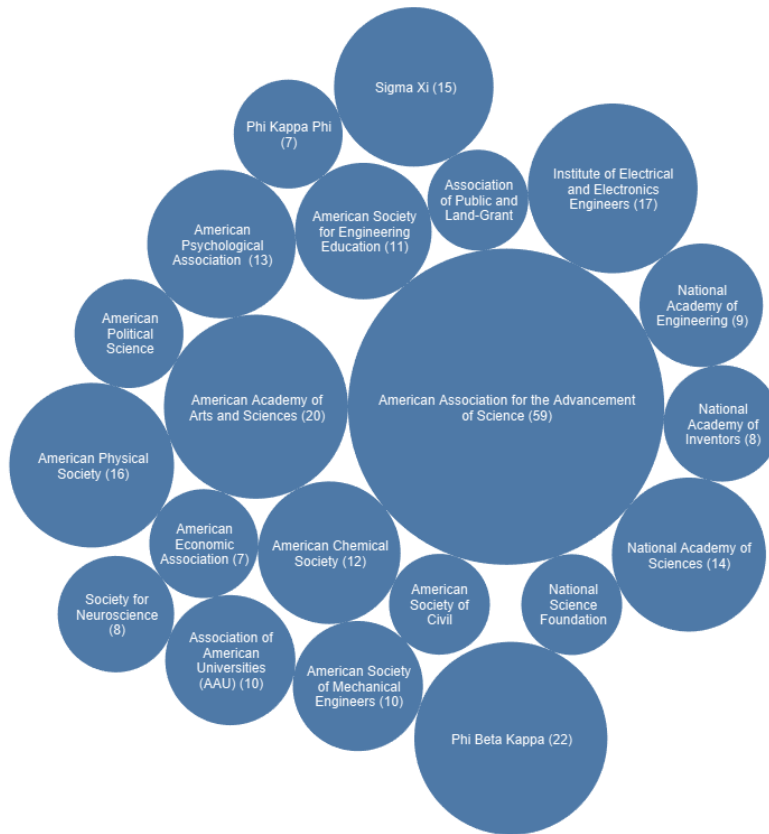
Synthesis

The findings of this research study contribute to the existing literature on CAOs in several ways. First, it presents a strong archetype that is an AAU CAO. An AAU CAO is a tenured faculty member with a PhD in a non-STEM, yet high status discipline. From 2008- June 2020 over half the AAU CAOs hold a PhD in a Hard or Somewhat Hard discipline, and two-thirds hold a PhD in a Pure or Somewhat Pure discipline. The most common disciplines being engineering, the physical sciences, and the social sciences. An AAU CAO also has previous experience serving as a Dean of an academic unit, has a prestigious academic pedigree (as indicated by AAU and R1 status), a strong scholarly record of research publications and grant awards, and has multiple academic institution and professional organization affiliations.

Second, this research study found few differences in accumulated forms of capital between the men and women AAU CAOs thus reinforcing the strength of this archetype. The existing literature on CAOs and faculty careers suggests gender differences in certain forms of capital were likely. Women in academia tend to be concentrated in lower status disciplines and institution types (Perna, 2005; Smart, 1991), take longer to the reach the rank of full professor, or never do (Carrigan, Quinn & Riskin, 2011; Link, Swann & Bozemann, 2008; Misra et al., 2011), have different career paths (ACE, 2013b, 2017; Johnson, 2017), publish fewer research publications (Brown & Samuels, 2018; Lone & Hussain, 2017; Strand & Bulik, 2018; Van den Besselaar & Sandström, 2017), are less likely to be awarded grant funding (Lerback & Hanson, 2017; Magua et al., 2017; Sheridan et al., 2017), and tend to have smaller, less diverse professional networks (McDonald, 2011; Milem, Sherlin & Irwin, 2001; Ponjuan, Conley & Trower, 2011) compared to men. However, the lack of gender differences observed among these key forms of capital suggest AAU institutions may be looking for women candidates who have similar backgrounds, experiences, and accumulated forms of capital as a traditional candidate who is a man. As previously noted, the strong archetype of an AAU CAO that emerged from this study is not reflective of many women in academia. The women AAU CAOs in the sample are largely from STEM disciplines, are star researchers, and have a prestigious academic pedigree. This is a high bar for anyone to obtain, but especially women given the myriad of challenges women face as they navigate the career path to CAO of an AAU institution. The existing literature on faculty careers suggest the following constraints impede the advancement and success of women faculty and discourage their future participation in academic leadership positions such as CAO: workload inequities, a male dominant culture and worker norms, a lack of critical mass in many disciplines, and barriers in the hiring process. The women AAU CAOs

153

in this sample were likely able to overcome such structural constraints and cycles of cumulative disadvantage that negatively impact other women in academia as evidenced by the lack of gender differences observed in accumulated forms of capital among the AAU CAOs in this study.

Only two significant gender differences were observed in this research study: (1) the total number of research publications men and women AAU CAOs had acquired at their time of appointment to the CAO position and (2) the proportion of women AAU CAOs with a PhD in an Applied discipline. The men AAU CAOs had on average, a higher total number of research publications and were more heavily concentrated in Applied fields like engineering than the women AAU CAOs. However, the women AAU CAOs in the sample were highly productive researchers as evidenced by their average total number of research publications (58.6). The women AAU CAOs were just as likely as the men AAU CAOs to have achieved tenure, which is highly dependent upon research productivity. This finding suggests that the total number of research publications a candidate for CAO of an AAU institution possess may not be as heavily weighted in hiring decisions as other forms of capital. It may be that, at this level, tenure is enough evidence of a strong scholarly record. While the women AAU CAOs in the sample were also underrepresented in the Applied disciplines, the majority of the women AAU CAOs come from other high-status disciplines such as the biomedical sciences, physical sciences, and social sciences.

Finally, this research study also informs us of what an AAU CAO generally, is not. An AAU CAO is not a faculty member without tenure or someone from outside of academia. An AAU CAO is also not someone who has spent their academic career at other institution types such as liberal arts institutions, women's colleges, or HBCUs. Only one AAU CAO in the sample previously worked at a women's college before their appointment as CAO of an AAU

154

institution and only three of the AAU CAOs in the sample attended a women's college for their

undergraduate studies. None of the AAU CAOs previously worked at an HBCU or attended an

HBCU for their undergraduate or graduate education. An AAU CAO is also likely not someone

who comes from what are considered lower-status disciplines such as education or the

humanities or someone who has devoted their academic career to teaching or service over

research. The implications of who an AAU CAO tends to be presents many potential barriers for

women and faculty of color aspiring to the role of CAO. However, there were some AAU CAOs

in the sample that deviated from the dominant archetype. Among the 17 AAU CAOs that did not

have a PhD, 13 were men with a J.D. or M.D, likewise, among the AAU CAOs who did not

previously work at an AAU institution (n=13) 8 were men, and 56 (34%) of men had less than

three academic affiliations compared to 9 (14%) of women AAU CAOs in the sample. While

these differences are descriptive given the small sample sizes, they suggest that men are more

often able to deviate from the dominant archetype of an AAU CAO than women. Men may be

able to break the mold more often than women because women often have to demonstrate a

higher level of competence than an equally qualified man (Avolio, Gardner, Valian, 2005; Eagly

& Carli, 2007; Heilman, Wallen, Fuchs & Tamkins, 2004; Walumbwa, Luthans & May, 2004)

and tend to be more heavily scrutinized during the hiring process (Leslie, Cimpian, Meyer &

Freeland, 2015; Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2012; Phelan, Moss-

Racusin & Rudman, 2008; Pitts, 2017). Thus, male candidates may not need to have a PhD in

order to prove their competence and their previous experience working at a different institution

type may not be as heavily scrutinized. Additionally, those in leadership positions often

reproduce themselves when selecting candidates for a position or promotion in order to control

for the uncertainties of managing organizations (Kanter, 1977). Given that white men comprise

the majority of academic leadership and senior faculty at AAU institutions, hiring committees may be more comfortable deviating from the mold with a male candidate than a female candidate simply because of his gender.

In the sections that follow I will expand upon the implications of the dominant archetype that emerged from this study as it relates to women's underrepresentation and full participation in the position of CAO at an AAU institution.

Implications for Policy and Practice

The findings of this research study bring to light several implications for individuals aspiring to the role of CAO of an AAU institution as well as implications for policy and practice within higher education institutions, and elite research institutions in particular: (1) The path for women aspiring to the role of CAO, (2) Workload inequities that create cumulative disadvantage (3) Lack of critical mass and chilly climates in many disciplines, and (4) Women's full participation in the role of CAO. I also present recommendations informed by the existing literature for both the individual and for research institutions to enact in order to improve women's representation and full participation in the role of CAO.

The Path for Women Aspiring to the Role of CAO

Perhaps the greatest contribution this research study makes to the field of higher education is revealing the dominant archetype of an AAU CAO and bringing to light key forms of capital that are important for an AAU CAO to possess so that women aspiring to the role can make strategic career decisions along their career path. Different forms of capital are important at different points along the path to the position of CAO. Unfortunately for future women CAOs, that path presents many challenges. The dominant archetype of an AAU CAO that emerged from the data does not align with most women's backgrounds, experiences, or accumulated forms of

156

capital. The archetype of an AAU CAO is a tenured faculty member with a PhD in a non-STEM, yet high-status discipline, a strong record of scholarly achievement in the form of research publications and grant awards, a prestigious academic pedigree, and has multiple academic institution and professional organization affiliations. While this archetype is gender-neutral, as evidenced by the lack of gender differences observed in accumulated forms of capital among the men and women AAU CAOs, is not reflective of the majority of women or women of color in academia.

Having an academic background in a high-status discipline is an important form of capital for an AAU CAO. Deciding to pursue a PhD in a STEM or other high-status field is likely the first point in time in which a strategic decision can be made by a woman aspiring to the role of CAO. While the majority of AAU CAOs from 2008 to June 2020 did not have a STEM background, more than half (55%) of the women AAU CAOs did. However, this is not representative of the broader population of women faculty and administrators who tend to be more highly concentrated in education and humanities fields (Melguizo & Strober, 2007). Faculty of color also tend to be more highly concentrated in the social science fields and less concentrated in the physical sciences and life sciences (NCES, 2017; NSF, 2016). Choosing to attend a prestigious institution for undergraduate and graduate school is another point in time where a woman can make a strategic career decision. As the literature demonstrates, prestigious institutions tend to hire faculty from other prestigious graduate programs and institutions (Burris 2004; Kennedy 1997; Oprisko, Dobbs & DiGrazia, 2013) and the prestige of one's department or institution is the strongest factor in first tenure-track faculty appointments (Burris, 2004). Thus, having a prestigious academic pedigree is an important form of capital for an individual applying for tenure-track faculty positions at prestigious research institutions.

Evidence of a strong scholarly record of research publications, impact upon the field, and grant awards are additional key forms of capital important for an AAU CAO to possess that are accumulated throughout an individual's faculty career. The literature demonstrates faculty at prestigious research institutions (such as the AAU institutions) are more likely to accumulate more research publications and research grants during their career compared to faculty at other institution types (Lerback and Hanson 2017; Magua et al., 2017; Sheridan et al., 2017; Witteman, Hendricks, Straus & Tannenbaum, 2019). Thus, individuals that accept a tenure-track faculty position at a prestigious research institution are in a better position to acquire other key forms of capital such as research publications and grant awards along their path to the CAO position. As discussed previously, women faculty tend to spend less time on research (Creamer, 1998; Misra et al., 2011), produce fewer research publications (Brown & Samuels, 2018; Lone & Hussain, 2017; Strand & Bulik, 2018; Van den Besselaar & Sandström, 2017), and are less likely to be awarded grant funding (Lerback & Hanson, 2017; Magua et al., 2017; Sheridan et al., 2017) compared to men faculty which can have negative implications for tenure and promotion.

Tenure is often the next steppingstone on the path to the provostship and thus, is an important form of capital for a future AAU CAO to hold. However, women faculty in general, are less likely to achieve tenure and to be promoted to higher ranks (Perna, 2001; Smart, 1991; Xu, 2012). Only 37.4% of tenure-track faculty are women, and only 27% of women faculty have achieved the rank of full professor compared to 42% of men (US Department of Education, 2016). Only 17% of all women full professors are women faculty of color (NCES, 2017). Among the STEM fields, women comprise only 33.9% of full professors despite earning about half the doctorates in science and engineering in the nation (NSF, 2018). Men on the other hand, comprise 51.4% of full professors within the STEM disciplines. Tenure is also the first

steppingstone into academic leadership. Given that the majority of AAU CAOs in the sample previously served as Dean of an academic unit before assuming the role of CAO, acquiring this form of capital along one's career pathway is important for the role of CAO. In sum, different forms of capital are important at different points along the path to the position of CAO. Thus, the findings of this study identify how individuals can be strategic about acquiring key forms of capital at different points in their career.

The findings of this study also bring to light ways women can leverage different forms of capital to improve their likelihood of being selected for the position of CAO of an AAU institution. For instance, holding a terminal degree in a STEM discipline may be a golden ticket for women aspiring to the role given that more than half (55%) of the women AAU CAOs from 2008 to June 2020 come from a STEM discipline. While there are many reasons that could explain this phenomenon, the social science and higher education literature suggests this form of capital adds to the woman's credibility (Kelly, 2011), perceptions of her competence and brilliance (Storage, Horne, Cimpian & Leslie, 2016; Leslie, Cimpian, Meyer & Freeland, 2015), and increases her eminence as a result of the prestige of the discipline's research culture (Becher & Trowler, 1989; Blackmore, 2007; Burris, 2004). Yet, it is well documented in the literature that women self-select out of the STEM fields (Blickenstaff, 2005; Diekman, Brown, Johnston & Clark, 2010), leak out of the faculty pipeline (Marschke et al., 2007; Van Anders, 2004; Wolfinger, Mason & Goulden, 2008), and experience lower rates of tenure and promotion in STEM disciplines (Xu, 2008; 2012). However, the women that do persist should realize that they have the potential and capital needed to become a CAO of a research institution. As stated previously, women are earning more than half of the doctorates awarded in science and engineering disciplines (NSF, 2018). Thus, actions can be taken to improve women and women

of color's representation among the faculty and administration within the STEM fields. In the sections that follow, I present examples of such actions institutions can take to mitigate the barriers facing women in these fields including increasing the critical mass of women, reducing gender inequities in workload and research productivity, and creating more supportive and welcoming environments for women in STEM disciplines.

Another way women can leverage a key form of capital needed for the role of CAO at an AAU institution is to apply for tenure-track positions at a R1 institution. Women can be strategic by making a lateral career move early in their career to move into an AAU institution if they did not receive an initial tenure-track appointment at a research institution of similar prestige. As this study demonstrated, institutional prestige is an important form of capital for an AAU CAO to possess and affiliations with prestigious academic institutions have significant positive effects on obtaining other key forms of capital such as research publications, grant awards, and prestigious professional affiliations. Affiliation with a prestigious research institution also increases the odds of being hired for the position of CAO at an AAU institution since academic institutions tend to hire from academic institutions of similar prestige (Burris 2004; Kennedy 1997; Oprisko, Dobbs & DiGrazia, 2013), or from within. Top-tier institutions in particular do not hire people from lower-tier institutions and since women are overrepresented at lower-tier institutions, that reluctance reinforces the status quo (Valian, 2005).

Previous experience as Dean of an academic unit is also a key form of capital women aspiring to the role of CAO can strategically acquire. Over half of the AAU CAOs in the sample had previous experience serving as a Dean followed by Vice Provost (15%) or other academic administrator (16%). This experience will likely remain a key form of capital for future CAOs given the tendency for homosocial reproduction. People tend to exhibit greater preference for

people like them, such as having the same background or experience (Gorman, 2005; Posselt, 2016). Thus, having previous Dean experience may ease concerns of fit and preparedness for the CAO position among women candidates because hiring committee members can identify with that shared experience and trust in their preparation for the role. Similarly, Deputy Provost/ Vice Provosts work directly under the CAO at many institutions. Experience serving in this position could also signal adequate preparation and experience for the role of CAO at an AAU institution as evidenced by the proportion of women AAU CAOs in the sample with this specific previous experience. Thus, women should be strategic in the path they take after achieving tenure. Department chair is often a natural next step after achieving tenure as it is the first entry point into academic administration (Callier, Singiser & Vanderford, 2015; Niemeier & Gonzalez, 2004) and prepares one for more senior administrative positions like Dean of an academic unit (Moore et al., 1983). The Deanship then follows as the next stepping stone along the path to the provostship. Thus, once one has gained department chair experience, women aspiring to the role of CAO at an AAU institution should seek deanships within their current institution (if it is an R1 or AAU institution) or at an institution of similar prestige. It is important to make clear that the responsibility is not only on the woman. Institutions must be willing to entertain nontraditional candidates for senior positions; women and other minority group members are less likely to fit the traditional profile of experience because they are less likely to have been chosen for leadership positions (Valian, 2005).

So far, I have only discussed how women aspiring to the role of CAO can leverage or strategically acquire key forms of capital that comprise the dominant archetype of an AAU CAO. It is also worth considering how the women AAU CAOs in this sample were able to reach their position despite not acquiring all of the key forms of capital exhibited by this archetype such as

an equal number of research publications as the men AAU CAOs. The results of this study may offer a small amount of reassurance, however. My findings suggest other forms of capital may be more important or more heavily weighted in hiring decisions than the total number of research publications one has acquired over the course of their academic career. It is likely that hiring committees pay less attention to the number of publications on a candidate's vitae at the level of CAO given that the candidate is most likely a tenured, full professor. This is because the tenure process ensures evidence of a scholarly record was achieved and that the candidate has a strong commitment to research and discovery. Thus, tenure may a more important form of capital for a future AAU CAO to possess as it signals evidence of a strong scholarly record and commitment to research and discovery.

Taken together, the findings of this study and the resulting dominant archetype of an AAU CAO can be somewhat discouraging for women aspiring to the role. However, such women can utilize the information I have presented to make strategic career decisions to acquire key forms of capital necessary for the position. As discussed throughout this section, the burden is not just on women to improve their representation in academic leadership. That is, we should move away from "fixing the woman" to fixing the institutional barriers and inequities that prevent women from advancing through the academic ranks and achieving positions of leadership. The barriers and inequities identified as limiting women's advancement and participation in academic leadership also affect women of color (Sturm, 2006). However, women of color also face other barriers as a result of racial bias and discrimination (Turner, Myers & Creswell, 1999). As a result, institutions may need to implement additional interventions to address specific barriers affecting women of color. Women alone cannot tackle gender inequities by simply overcoming the structural barriers that prevent their career advancement in academia

(Kim, Fitzsimons & Kay, 2018; Stewart & Valian, 2018; Valian, 2005). The responsibility must also be on the institutions and elite research institutions in particular, to take necessary steps to make needed structural changes. Without doing so, women will continue to struggle to fully participate in the role of CAO at the AAU institutions. The sections that follow will discuss such structural changes and ways institutions can enact such changes.

Workload Inequities that Create Cumulative Disadvantage

Gender differences in the total number of research publications the women AAU CAOs in my study obtained suggest workload inequities may be at play. It is well documented in the literature that significant differences by gender and race in faculty workload exist and systematically negatively impact women and faculty of color (Guarino & Borden, 2017; Link, Swan, & Bozeman, 2008; Misra et al., 2011; O'Meara et al., 2017, 2019). Women faculty tend to spend more time on teaching and service for a number of reasons; chief among them is women are asked more often to complete less rewarded tasks (Mitchell & Hesli, 2013; O'Meara et al., 2017b) because of social expectations that they will say yes (Babcock et al., 2017). Unfortunately, differences in time spent on teaching and service have consequences for research productivity and advancement among women (Creamer, 1998; Misra et al., 2011). Differences in who is asked to do what coupled with a lack of transparency in who is doing what creates workload inequities among men and women faculty (O'Meara, 2019a,b). Inequities in workload create cumulative disadvantages for women and women of color. Higher teaching loads and service commitments result in less time to devote to research; Less time spent on research results in fewer research publications, lower impact upon the field, and lower likelihood of receiving grant awards, which in turn negatively impacts chances for tenure (Link, Swann & Bozeman, 2008; Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva & Nyunt, 2017). This cycle

of cumulative disadvantage may serve as an insurmountable barrier to women's advancement at research institutions in particular given the emphasis placed on research productivity in the academic reward system. Less tenured women faculty creates a smaller pool of qualified women applicants for the position of CAO at an AAU institution given that tenure is an important qualification needed for the role.

A key aspect of prestige is the accumulation and transaction of indicators of esteem. Such indicators include academic rank, research publications, and competitive grants awards (Coate & Kandiko Howson, 2016). A lack of such indicators can have negative implications for women's career advancement in academia and preparation for the role of CAO. Breaking this cycle of cumulative disadvantage requires systematic effort at a number of levels, but the first step is to recognize how the virtuous cycle of the attainment of prestige factors can work to the advantage of men's careers, while the cumulative cycle of disadvantage can hinder women's careers in academia (Coate & Kandiko Howson, 2016). Thus, institutions must develop strategies to support women faculty in ways that promote workload equity and career success in the academy. O'Meara and colleagues (2019) offer several strategies academic departments and leaders can enact to support equity in workload. Such strategies include providing transparent data on faculty work activities, creating planned rotations of teaching and service roles, establishing credit systems, fostering a commitment to fair workload, and setting clear benchmarks and expectations for all faculty. Such transparency has the potential to enhance the agency of women who are taking on a greater share of the work by empowering them to say no to new work activities or less rewarded work requests, and for departments as a whole to re-distribute work activities to be more equitable (O'Meara et al., 2019; O'Meara et al., 2020). Likewise, Hart (2016) charges department chairs to distribute workloads evenly and pay attention to the cost of hidden

164

workloads that may be negatively impacting women. Women faculty of color are especially susceptible to hidden workload or 'invisible labor' (SSFNRIG, 2017). Women faculty of color tend to spend a greater amount of time and energy on student mentorship and advising, as well as service work compared to men faculty of color (Griffin et al. 2011), often at the expense of their research (Baez, 2000; Harley, 2008; Tierney & Bensimon, 1996; Turner & González, 2011).

In a similar vein, many women faculty of color are engaging in research that furthers diversity, equity, and inclusion (DEI) efforts. Unfortunately, faculty engaging in this work often face undervaluation of their research interests, approaches, and theoretical frameworks (Turner, Gonzalez & Wood, 2008; Valian, 2006). One way departments and institutions are elevating the importance of DEI work is by requesting applicants for faculty positions to provide a statement on diversity, equity, and inclusion. Requesting DEI statements during the faculty hiring process can bring needed visibility and prestige to this work and reinforce the notion that these efforts should be the responsibility of all faculty, not just those from historically underrepresented or minoritized backgrounds (Sylvester, Sánchez-Parkinson, Yettaw & Chavous, 2019). DEI statements also enable hiring committees to identify faculty who will be able to contribute to the department's and institution's DEI efforts through scholarship, teaching, and service (Sylvester, Sánchez-Parkinson, Yettaw & Chavous, 2019), thus reducing the burden that is disproportionately placed on faculty of color. Creating more equitable workloads for women faculty, and women faculty of color in particular, will enable them to spend their work time on activities that can improve their chances of promotion and tenure such as research and grant writing. Thus, institutions that take the steps necessary to promote workload equity can break the cycle of cumulative disadvantage impacting many women faculty and aspiring women leaders.

The strategies presented above are focused upon actions that can be taken at the department level because this is where many work-related activities are realized and distributed including teaching assignments, student advising, and service roles (O'Meara et al., 2019). In addition, departments play a critical role in faculty retention, satisfaction, recognition, and professional growth (Bensimon, Ward, & Sanders, 2000; Callister, 2006; Latimer, Jackson, Dilks, Nolan & Tower, 2014). Senior faculty and department chairs are also in a unique position to enact change within their department and reduce workload inequity by implementing the aforementioned policies and practices (O'Meara et al., 2019). Buy in from leaders signals that something is important and can foster successful implementation of policies and practices that support equity (Billimoria, Joy & Liang, 2008; Rudman & Phelan, 2008) as well as broader institutional transformation (Eckel & Kezar, 2003).

It is also important to acknowledge the impact department chairs can have on inclusion, transparency in decision making, and the career advancement of women faculty. Department chairs must recognize how their role and actions in that role can impact women (Conrad et al., 2010). To foster equity minded reform and give women faculty the opportunity to become department chairs, departments should also consider term limits and rotations for department chairs. Given that department chair is the first step to moving into academic administration (Callier, Singiser & Vanderford, 2015; Niemeier & Gonzalez, 2004), providing greater opportunity for women to become department chairs provides more women with the administrative experience necessary for other administrative positions such as Dean and CAO. Overall, it is important for tenured faculty and department chairs to lead efforts to reduce workload inequities among women faculty (O'Meara et al., 2019). Thus, department leaders are in a unique position to develop or enact the strategies presented above to support women faculty

in ways that promote equity and improve women's representation and full participation in academic leadership.

Lack of Critical Mass and Chilly Climates

Another reason women tend to have fewer research publications compared to men is due to structural constraints that work against women. Women tend to be segregated in the types of institutions, academic fields, and work roles that have lower prestige and value (Perna, 2005; Smart, 1991). Women within prestigious institutions and high-status academic fields often lack critical mass which creates additional challenges for women to overcome. The findings of this study revealed more than half of the women AAU CAOs come from STEM disciplines and are most highly concentrated in the biological and biomedical sciences, social sciences, and physical sciences. While women tend to be more equally represented in the social sciences (Beutel & Nelson, 2005) and the biological and biomedical sciences (NSF, 2018), this is not the case in the physical sciences or many other STEM disciplines. Research also shows women tend to have less research publications than men in the physical sciences (Creamer, 1998), and median times to promotion from associate to full professor are one to two years longer for women than men in the biological and biomedical sciences (Gumpertz, Durodoye, Griffith & Wilson, 2017). Women faculty in STEM often lack critical mass which contributes to chilly climates, feelings of isolation, and workload inequities (Carrigan, Quinn & Riskin, 2011; Xu, 2008). Research demonstrates science and engineering disciplines in particular, have remained inhospitable to the representation, advancement, and inclusion of women (Burke & Mattis, 2007; Etzkowitz et al., 1994). The culture within these disciplines provide women with fewer opportunities and limited support (Xu, 2008). Achieving a critical mass of women in a department is associated with a

more positive department climate and significantly greater productivity for all faculty, including women, as a result of that climate (Sheridan et al., 2017).

Thus, one way to improve workplace climates within STEM and research productivity and tenure rates for women in these male-dominated fields is to achieve critical mass. Women in disciplines with critical mass allocate their time in ways that are more aligned with their male colleagues compared to women in departments without critical mass (Carrigan, Quinn & Riskin, 2011). This alignment of work time has positive implications as it creates greater equity in productivity and advancement (Carrigan, Quinn & Riskin, 2011). In departments without critical mass, women faculty are more likely to experience increased teaching loads, less time for research, and produce fewer research publications which has negative implications for promotion and tenure (Xu, 2012). These findings suggest that departments that wish to increase the number of grants and research publications their faculty achieve would be wise to foster a positive workplace climate for women faculty (Sheridan et al., 2017). Overall, positive and supportive work climates and more balanced gender composition of the discipline or field has a positive impact on women's productivity and representation in the higher faculty ranks (Smart, 1991), thus underscoring the importance of achieving critical mass.

To achieve critical mass and improve climates for women in academia, institutions need to take several approaches. First, they must commit to hiring more tenure-track women faculty and women faculty of color in departments where they are underrepresented. By increasing the number of women in these departments, women will be in a better position to impact the culture of male-dominated disciplines and create more welcoming and supportive environments for other women (Kanter, 1977; Kulis, Sicotte & Collins, 2002; Nelson & Rogers, 2005). Second, male worker norms must be challenged and alternative ways of work supported. As Barber

(1995) argued, institutions should focus on broadening and diversifying cultural norms of male-dominated disciplines in order to provide a healthy and supportive work environment for women faculty. Changing cultural norms is difficult, however. Departments and institutions need to assess which norms and institutional structure support men's professional development and career advancement, but hinder women's. One such norm concerns the definition of academic success within male-dominated fields. Success is defined as an unrestricted availability to work at the expense of personal life commitments (Damaske, Ecklund, Lincoln & White, 2014). Institutions must commit to changing this norm and support alternative ways of work. Like workload inequities, cultural norms can be changed with the support of leaders and the dominant group (e.g., senior male faculty and department chairs) (Sallee, 2012). Leaders and tenured men faculty can demonstrate commitment to alternative ways of work by implementing policies and practices such as work-life integration policies (Rapoport et al., 2001). It is not enough to implement such policies, however. Leaders and the dominant group must also utilize these policies themselves and normalize conversation about their use. In STEM fields in particular, work–life accommodations are linked to cultural beliefs that mothers violate the organizational mandate for work devotion and are less committed to work (Williams, Blair-Loy & Berdahl, 2013). Department chairs in particular can positively influence the climate for work-life integration by role-modeling positive work-life behavior and making visible the work-life policies available to faculty within their units (Lester & Sallee, 2017; O'Meara et al., 2020). By doing so, women with commitments outside of work will feel more supported in male-dominated environments and may be less likely to self-select out of these fields.

Finally, institutions can improve the climate for women and women of color by providing more formal structures that foster support for women faculty and administrators such as formal

mentoring programs. NSF-ADVANCE institutions have put in place practices where a senior

woman faculty member within an academic unit is paired with a junior woman faculty member

in the same unit to serve as a mentor (Blau, Currie, Croson & Ginther, 2010; Furst-Holloway &

Miner, 2019; Laursen, Austin, Soto & Martinez, 2015). Likewise, ADVANCE institutions have

developed similar programs focused on women faculty of color (Furst-Holloway & Miner,

2019). Such programs have proved to be an effective strategy in reducing feelings of isolation

and improving retainment of women faculty within male-dominated fields or fields where

women lack critical mass (Dunham-Taylor, Lynn, Moore, McDaniel & Walker, 2008; Ibarra,

Kilduff & Tsai, 2005; Piercy et al., 2005; Pololi & Knight, 2005). Mentors provide a form of

collegial support, and when such support less accessible, it is more difficult for women to feel

connected to the institution or their department, receive important information regarding their

career, establish research lines and collaborations, and secure grant funding (Kemelgor &

Etzkowitz, 2001). However, it is important for men to also serve as mentors for women faculty

and administrators. Women face more challenges than men in obtaining career-advancing

mentoring, and thus frequently lack social capital in the form of mentors and professional

networks they are introduced into through mentors (Etzkowitz et al., 2000), especially in the

STEM disciplines (Blackburn, 2017). Given that men tend to have access to more influential

professional networks than women in academe, such mentorship can provide women with

greater access to these types of networks. While some men find it difficult to effectively mentor

women, formal mentoring programs that recognize that styles and advice that worked for the

mentors may not work for their women mentees can provide men with other strategies than are

more successful for and relevant to women (Blau et al., 2002; Bickel et al., 2002). Thus, it is

important for the institution to make a commitment to formally develop mentoring programs in

order to provide the support needed for women and women of color to amass the benefits of mentorship (Stewart & Valian, 2018; Valian, 2005). By doing so, institutions can improve women's representation in male-dominated disciplines and promote their future participation in academic leadership roles like CAO.

Women's Full Participation in the CAO Role

The dominant archetype of an AAU CAO has several implications for women's full participation in the role of CAO at the AAU institutions. First, it underscores who an AAU CAO is, and who an AAU CAO is not. Unfortunately, many women in academia fall into the latter category given that the majority of woman AAU CAO's from 2008- June 2020 hold a PhD in a high-status discipline from a top university, have made their academic career as a tenured faculty member and then an academic administrator at the most prestigious universities, and are highly productive and impactful researchers and grant award gatherers. Overall, women and Black, Brown and Indigenous faculty are often disadvantaged in tenure and promotion decisions, awarding of grants, invitations to conferences, nominations for awards, and forming professional collaborations- all of which are critical for career advancement (Lerback and Hanson 2017) to the CAO level. Bourdieu's (1986) concept of accumulation of wealth illustrates how those with more capital are in a better position to attract more and more capital, while those with less capital are at a disadvantage. Thus, disparities in accumulated capital can limit women's full participation in the role of CAO at the AAU institutions. Likewise, the types of institutions that women are most highly concentrated in- community colleges, women's colleges, and teaching colleges- are considered less prestigious than the research universities that comprise the AAU. Due to the prestige economy that exists within academia, prestigious institutions prefer to hire from one another in order to maintain or bolster their prestige (Coate & Kandiko Howson, 2016;

Farnum, 1990; Oprisko, Dobbs & DiGrazia, 2013). As a result, an AAU CAO not only needs to have acquired key forms of capital to be qualified for the role of CAO (e.g., tenure, research publications, and grant awards), but they also need to have a prestigious academic pedigree so that the hiring institution can maintain or bolster its own prestige. Thus, women who come from less prestigious institution types are less likely to be considered for the role of AAU CAO.

Compounding the challenge women face in accumulating indicators of prestige is the tendency for people to exhibit greater preference for people like them, such as having the same skin color, gender, background, or experience (Gorman, 2005; Posselt, 2016). Those in leadership positions reproduce themselves in their own image when selecting candidates for a position or promotion in order to control for the uncertainties of managing organizations (Kanter, 1977). This is especially problematic for women of color given the paucity of women academic leaders of color in academia. Shared institutional affiliations can also serve as a proxy for the quality of the candidate (O'Meara, Culpepper & Templeton, 2020) and a tool to weed out other candidates for consideration (Oprisko, Dobbs & DiGrazia, 2013). This is problematic given that such preferences or tendencies can lead to homosocial reproduction. Many academic leadership positions, and the leadership networks within academia, are comprised of senior white men- often referred to as the "old boys club" (Fisher & Kinsey, 2012; McDonald, 2011). Thus, the tendency to hire individuals that look like yourself and homophily in leadership networks, may privilege men over women in the hiring process for CAO. In addition, the insular hiring practices of prestigious institutions further advantages candidates that are men. If the AAU institutions continue seeking to maintain institutional prestige and academic capital by hiring from each other, and the leaders within these institutions continue to reproduce themselves, men will continue to be selected for leadership positions at a greater rate than women. According to

DiRamio and colleagues (2009), the pursuit of prestige may be causing a closed system to emerge. Closed systems are problematic because they are resistant to change. "Programs continue to move through an era of increased accountability, pursue new educational markets, and face globalization. Closed systems are not well suited to confront these challenges because of their inability to adapt to difficult situations and incorporate new ideas" (DiRamio, et al., 2009, p.158). In a time where higher education is undergoing significant change, the AAU institutions are doing themselves a disservice by not hiring more women and underrepresented minorities for the position of CAO. Diversity or heterogeneity in leadership results in better decision making (Erhardt, Werbel & Shrader, 2003; Raatikainen, 2002; Watson, Kumar & Michaelsen, 1993) and positive outcomes for the institution (Ehrenberg et al., 2009; National Resource Council, 2010). Given these outcomes, hiring more women and Black, Brown, and Indigenous CAOs should be a strategic focus of research universities.

One way research universities can improve diversity in leadership is by considering whether the key forms of capital identified in this research study actually prepare one for the role of CAO. Many of these key forms of capital function as gatekeepers rather than indicators or evidence that a person is prepared for and will be successful in the role of CAO at an AAU institution, perhaps with the exception of previous experience serving as Dean of an academic unit. A study of successful performance in the role of CAO in community colleges found competency in interpersonal dynamics, managerial operations, instruction and instructional design, capacity development, and collaborative leadership to be important knowledge, skills and abilities for a CAO to possess (Lutz-Ritzheimer, 2005). The role of CAO requires an ability to communicate effectively with a wide variety of individuals and groups, as well as an ability to develop positive working relationships that build productive partnerships (Lutz-Ritzheimer,

2005). Women leaders tend to exhibit greater focus on interpersonal relationships and are more likely to engage in communal and shared decision-making than men leaders (Chliwniak, 1997; Eagly et al., 2003; Townsend & Twombly, 1998). Many scholars argue that this leadership style, or competency, is necessary for educational, cultural, and structural change (Chliwniak, 1997; Richart, 2002, Young, 2004). Women leaders therefore, may be better suited to lead our higher education institutions during times of immense change such as the global pandemic. Higher education is faced with many challenges, not limited to falling enrollments, decreased funding and tuition revenue, and a rapid transition to online teaching and learning. Engaging in communal and innovative decision making could be the difference between an institution surviving this period of change and not.

In a similar vein, competency in capacity development includes hiring, nurturing, and retaining faculty and staff (Lutz-Ritzheimer, 2005). One way to cultivate this skill is through mentoring students and more junior faculty. Women and faculty of color in particular spend a greater amount of time and energy in mentoring and developing others (Baez, 2000; Griffin et al. 2011; Harley, 2008; Tierney & Bensimon, 1996; Turner & González, 2011). As a result, women and Black, Brown, and Indigenous candidates may be better prepared for this aspect of the role of CAO. Managerial competency requires skill in developing and monitoring complex budgets and assessing the instructional division's financial status, forecasting demand for services, helping the college to secure funding, and maintain accreditation (Lutz-Ritzheimer, 2005). While evidence of securing grant awards indicates some level of the cultivation of these skills, managerial operations are likely much more complex at the level of CAO compared to an individual researcher's portfolio of research grants. Knowledge of accreditation standards for instance, may be better cultivated through participation in university service activities such as

accreditation reviews and developing new academic program offerings. Thus, experience serving on such committees may be an important form of capital for hiring committees to look for in an AAU CAO candidate. Given that women and faculty of color tend to participate in more service activities than men faculty, (Link, Swann & Bozeman, 2008; Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva & Nyunt, 2017) women and Black, Brown, and Indigenous candidates may have an advantage at demonstrating this competency.

Likewise, competency in instructional design requires an extensive knowledge of instructional methods as well as an ability to address issues that arise around the quality of teaching and learning (Lutz-Ritzheimer, 2005). Given that women tend to spend more time teaching (Link, Swann & Bozeman, 2008; Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva & Nyunt, 2017) and employ a greater range of pedagogical techniques in their teaching (Hurtado et al., 2011), women may have another advantage if hiring committees consider this an important form of capital or competency for an AAU CAO to hold. As a result of the current pandemic, institutions are being forced to quickly adapt their teaching models to provide a combination of online and in-person courses, adaptive learning technologies, and pedagogy that best solves the learning needs of non-residential and non-traditional students (Latham & Braun, 2020). Thus, a commitment to teaching excellence and the use of effective pedagogical techniques may become increasingly important for a CAO to demonstrate. Taken together, women and faculty of color may able to accumulate other forms of capital that are important for the role of an AAU CAO and reduce disparities in the accumulation of prestige if hiring committees give greater weight to knowledge, skills and experience that prepare one for the role of CAO rather than relying on other forms of capital that may be weeding out women and Black, Brown, and Indigenous candidates.

Finally, the dominant archetype of an AAU CAO also offers insight into how an individual will lead their institution. The deanship is the most common previous experience among the AAU CAOs in the sample, and thus has been proven to provide the necessary training and experience for the role of CAO. Because academic deans have had little formal training for their role (Morris, 1981; Rosovsky, 1990; Wolverton, Gmelch, Montez & Nies, 2001) it is reasonable to assume that disciplinary work paradigms may influence and inform their professional work (DelFavero, 2005). Thus, disciplinary values may have a significant impact on administrative experience and approaches to leadership (DelFavero, 2005). A study of academic deans by DelFavero (2005) finds leaders from high-consensus disciplines tend to have higher relative autonomy in decision-making and work pursuits. Leaders from low-consensus disciplines tend to be more collegial in decision-making, and more subject to administrative influence (DelFavero, 2005). Thus, association with a low-consensus discipline may be an advantage for a Dean (or CAO) given that the role requires extensive relationship-building (DelFavero, 2005). However, the majority of AAU CAOs come from high-status disciplines, which also tend to be high-consensus fields. As a result, their disciplinary background and resultant leadership style may not be ideal for a role in which developing relationships is important and engaging in collegial decision making is fundamental. Thus, hiring committees that consider candidates from low-consensus fields for the position of AAU CAO may increase the number of women candidates given that women tend to be more highly represented in these fields.

In sum, the dominant archetype that emerged from this study highlights ways in which women's full participation in the role of AAU CAO is constrained. To increase the representation and participation of women and other underrepresented minority groups in

academic leadership positions such as CAO, higher education institutions must become more inclusive. They must move away from insular and reproductive hiring practices, gendered conceptions of leadership, reliance on proxies of prestige, and consider other evidence of preparation for the role of CAO at an AAU institution. For such change to be successful and sustainable, organizations must systematically break down these barriers constraining women's participation and embrace transformational change (Billimoria, Joy & Liang, 2008). In doing so, institutions will be better suited to rise above the challenges facing higher education today and in the future.

<div align="center">**Limitations**</div>

There are several limitations to this research study. As discussed in chapter three, a potential limitation of this research study was the use of publicly available data online given the risk that it could be inaccurate or incomplete. I was able to obtain data on the AAU CAOs in the sample for the majority of the measures of human capital, cultural capital, and social capital I examined. I also made a strong attempt to ensure the accuracy of the data I collected by triangulating against multiple sources. However, data on h-index scores was an exception. I was only able to collect data on the h-index scores for 80 of the 230 AAU CAOs in the sample. The AAU CAOs I was not able to collect h-index scores for were either not listed in Google scholar or were not assigned an h-index score. H-index scores were not developed until 2005 and Google scholar calculates these scores by analyzing citation patterns of articles within the Google scholar database. It is possible that the AAU CAOs I was not able to find an h-index score for published much of their research before Google scholar and h-indices were highly utilized and thus this data was not available. As a result, my findings may not be representative of the whole population and may have resulted in the null finding.

I was also unable to examine differences by race/ ethnicity among the AAU CAOs in the sample. While I added to the previous work of June and Bauman (2019) by collecting race/ ethnicity data for the newly added AAU CAOs, I did so by using the same approach as June and Bauman (2019) by referencing pictures available online for each CAO and making a determination of race/ethnicity (white v. non-white) based upon the pictures. I recognize however, that this method of data collection is imperfect. It is subject to the researcher's interpretation of another person's race/ ethnicity and may not be reflective of how a person actually identifies. In an attempt to collect more accurate race/ethnicity data, I also requested the AAU CAOs to self-identify their race/ ethnicity via email or through a google form. Unfortunately, a low response rate prevented me from using this demographic variable in my analysis of the data.

A second possible limitation of my research design is the selection of key forms of capital to study. It is possible there are other forms of capital equally important for the role of CAO at an AAU institution that are not examined in this research study such as leadership competencies (forms of human capital), information capital, and financial capital. As noted earlier, a study of community college CAOs found interpersonal, managerial, instructional, developmental, and leadership talents to be important competencies (or knowledge, skills and experience) for a CAO to be successful in their role (Lutz-Ritzheimer, 2005). The accumulation of information is also likely important for leaders. The concept of information capital is based on the assumption that information has intrinsic value which can be shared and leveraged within and between individuals and organizations. Thus, sharing information is a means of sharing power. Professional networks can be influential in the sharing of such information capital and power as they enable communication of system knowledge and information necessary to prepare for

advancement (Milem, Sherlin & Irwin, 2001; O'Meara, 2016; Perna, 2001; Tierney & Bensimon, 1996). Finally. financial capital is also likely influential on the path to the position of CAO of an AAU institution. Financial capital as it relates to education is based upon the assumption that by spending more money on education, educational quality will improve, thus bolstering student achievement. Among college students, financial capital has been found to significantly influence college selection (Paulsen & St. John, 1997, 2002) and persistence decisions (Berger, 2000; Paulsen & St. John, 2002). This research suggests students from lower SES backgrounds may self-select out of more expensive colleges such as the Ivy League institutions or not persist through to graduation. This in turn can create smaller pools of graduate students, faculty, and leaders from lower SES groups. However, the use of publicly available data in this research study prevented the inclusion of these specific forms of capital.

Finally, the nature of this research study had the potential to result in a null finding and thus not uncover gender differences among the forms of capital the men and women CAOs of the AAU have accumulated. While some statistically significant gender differences were observed regarding academic disciplines and research publications of the AAU CAOs in the sample, many of my hypotheses analyses resulted in a null finding. However, these null findings, in addition to the gender differences observed, still make an important contribution to the literature and offers several recommendations for policy and practice as articulated in the previous sections of this chapter.

Future Research

The findings of this research study bring to light several areas for future research. First, future research should investigate what hiring committees look for in AAU CAO candidates. Specifically, what the most important forms of capital needed for the position are. Existing

research finds doctoral institution prestige (Burris, 2004; Clauset, 2015; Oprisko, Dobbs & DiGrazia, 2013), scholarly record (Lerback & Hanson, 2017; Wright & Vanderford, 2017), and letters of recommendation (Madera et al., 2018; Madera et al., 2009; Schmander, Whitehead & Wysocki, 2007) are important forms of capital considered in faculty hiring decisions. Research by Gibney and Shang (2007) find letters of recommendation, access to outside resources and an ability to use them to one's advantage, tenure, ability to raise funds, and ability to access resources for graduate students (e.g., funding, employment opportunities, and research facilities) to be key forms of capital considered for the role of Dean by hiring committees. While this research study suggests tenure, previous administrative experience such as a deanship, a strong scholarly record of publications and grant awards, and affiliations with prestigious academic institutions and professional organizations are key forms of capital needed for the role of CAO at an AAU institution, other forms of capital are likely important (e.g., leadership competencies, information capital, financial capital). Thus, future research should examine such forms of capital, and shed light on what forms of capital are weighted more heavily than others in AAU CAO hiring decisions.

Institutions are also under scrutiny for their climates around diversity, equity, and inclusion. According to Creary (2020), effective DEI engagement is leader-led and must come from the top. DEI work must be central to an organization's culture and is mission-critical for driving significant and long-term progress (Creary, 2020). Given that these are important facets of the role of CAO, it is likely important for a future CAO to also demonstrate a commitment to DEI through their teaching, research, and service. Thus, future research should examine how current AAU CAOs are engaging in teaching reform and DEI efforts, and the extent hiring

committees consider these forms of capital among CAO candidates given the current

environment.

Second, future research should examine how networks born out of academic affiliations

and professional organizations are leveraged throughout the careers of CAOs, and during the

hiring process for a CAO position. Senior administrative positions are often advertised in

professional association newsletters or disciplinary association email lists (O'Meara, Culpepper

& Templeton, 2019). As a result, membership in these types of organizations can provide

knowledge of career opportunities like a CAO position opening and can facilitate connections

with members of the organization who may have additional knowledge or can act as a referral for

the position. Thus, professional organizations can function as a professional network that

members of the organization can leverage for career advancement. Academic affiliations can

also comprise a network. As stated previously, individuals exhibit strong preferences for people

who share qualities or background characteristics similar to their own (Gorman, 2005). Thus,

search committee members recruit from their alma maters and exhibit preferences for candidates

who graduated from the same academic institution or share other background characteristics

(O'Meara, Cullpeper & Templeton, 2020; Posselt, 2016). This is especially problematic for

faculty of color given that the underrepresentation of students of color at prestigious research

institutions such as the Ivy League; Black students make up only 9% of the freshmen at Ivy

League schools but 15% of college-age Americans and Hispanic students comprise only 15% of

the freshmen at Ivy League schools but 22% of college-age students (Ashkenas, Park & Pearce,

2017). Prestige is also used as a proxy for quality among search committee members, wherein it

is assumed that candidates from more prestigious institutions are worthy of being recruited or

selected, while candidates from less prestigious institutions are not as worthy (O'Meara,

Culpepper & Templeton, 2020). Given that professional organizations and academic institution affiliations can comprise professional networks, it is likely that AAU CAOs have leveraged or benefited from their professional and academic affiliations throughout their career. Future research should investigate how professional organization memberships and academic institution affiliations are utilized as part of a CAO's professional network. It would also be worth exploring whether membership in prestigious organizations is an advantage during the recruitment and screening process for positions like CAO. It seems likely executive search firms utilize professional organizations as a means of identifying potential candidates for the position of CAO.

Third, future research should examine the size and composition of the current AAU CAO's professional networks. Women faculty and administrators face greater challenges than men in accessing professional networks that contain the knowledge and skills that can aid in their career advancement (O'Meara, 2016; Perna, 2001; Tierney & Bensimon, 1996). Like mentors, professional networks are important for women's career advancement because such networks communicate system knowledge and information necessary to prepare for advancement (Milem, Sherlin & Irwin, 2001; O'Meara, 2016; Perna, 2001; Tierney & Bensimon, 1996). However, women face structural constraints in developing personal and professional networks because homophily strongly influences the creation of such networks and the flow of network formation (Ibarra, 1993). As discussed in previous chapters, access to a larger and potentially more influential network of men contacts can be beneficial for the career success of women faculty and administrators given the tendency for men to occupy more powerful positions within the academy. Male networks tend to include other high-status individuals and men utilize these networks to obtain job-related information and opportunities for professional advancement

(Milem, Sherlin & Irwin, 2001). Research that looks at the size and composition of AAU CAO networks can determine if women AAU CAOs have smaller, more homophilous networks as the literature would suggest, or if they have larger, more heterogeneous networks comprised of both men and women. Such insight could reveal strategic advantages in network composition that women AAU CAOs have employed to advance in their career.

Finally, this research study as well as June and Bauman's (2019) findings bring to light the lack of racial and ethnic diversity among the CAOs of the AAU institutions. While I was not able to examine differences in the various forms of capital accumulated by AAU CAOs by race/ethnicity, future research is needed to better understand the underrepresentation of CAOs of color. Faculty and administrators of color experience similar challenges as women in male-dominated arenas. However, they also face other barriers as a result of racial bias and discrimination (Turner, Myers & Creswell, 1999), and devaluation of their research (Turner, Gonzalez & Wood, 2008; Valian, 2006). For women faculty and administrators of color, such challenges are compounded by their multiple marginality (Eaton et al., 2019; Kachchaf et al., 2015; Williams & Dempsey, 2014). Thus, future research should explore whether AAU CAOs of color, like many women AAU CAOs in this sample, have adapted to or reflect the traditional forms of capital white, male AAU CAOs have accumulated. The findings of this research study suggest this may be the case. Researchers could begin by expanding my dataset to include more accurate race/ethnicity data and conduct a more in-depth study of AAU CAOs of color through other techniques such as structured interviews.

Conclusion

This study makes an important contribution to the field of higher education by bringing to light key forms of capital among the AAU CAOs from 2008 to June 2020. Such information has

the potential to inform individuals aspiring to the role of CAO at an AAU institution of key

forms of capital needed for the role and enable them to take strategic steps to acquire such capital

throughout their academic career. While many of my hypotheses and subsequent analyses

resulted in a null finding, there were some statistically significant gender differences observed

regarding disciplinary background and research publications. These results suggest structural

barriers like field segregation and lack of critical mass in many disciplines, as well as gender

inequities in workload and time allocation may be contributing to women's underrepresentation

in the role of CAO of an AAU institution.

Of equal importance, the null findings of this study underscore the disparities that exist

between men and women in academia; women CAOs who are able to achieve tenure, move into

academic administration, and are selected by a hiring committee for the role of CAO at an AAU

institution are those that have overcome gender disparities and structural barriers by emulating

their male counterparts in terms of career path, accumulated forms of capital, and professional

affiliations. For women aspiring to the role of CAO, this can paint a grim picture for their future.

The current women AAU CAOs are a highly accomplished group of women who survived a

series of selection challenges throughout their career. However, research such as this study bring

to light ways aspiring women leaders can prepare and acquire the capital needed for the role of

CAO at an AAU institution. Of equal importance, studies such as mine also bring to light the

structural constraints and various inequities that are preventing other women from following this

career path. Thus, institutions that wish to improve gender diversity in their leadership should

consider the recommended policies and practices presented in this study. By enacting such

policies and practices, future women aspiring to the role of CAO at an AAU institution will be

better supported, face less barriers to their advancement, participate more fully in the position of

CAO at an AAU institution.

Appendix

Appendix A: Email to CAOs

Greetings,

I am a doctoral student in the Graduate School of Education at the University of Maryland, and am conducting research that focuses on the backgrounds and professional affiliations of the chief academic officers of the institutions that comprise the Association of American Universities (AAU). While preparing for this research, I have identified you as a current or past chief academic officer of an AAU institution and subject of interest for this research study.

Using *curriculum vitae* and other biographical and professional information found online, I am building a database of the backgrounds and professional affiliations of the AAU chief academic officers. With this data, I plan to explore the following areas:

- The forms of capital that may have assisted with your advancement to this position including degree type, tenure status, publication record, grant awards, and previous experience
- Professional affiliations you are a member of including professional organization memberships and institutional affiliations (e.g., undergraduate and graduate institutions)
- The role of gender and race/ethnicity in the pathway to the AAU CAO position

I would very much appreciate receiving a copy of your *curriculum vitae* as well as *key demographic information (*gender and race/ ethnicity) that would aid my exploration of the aforementioned areas. If you are willing to provide this information to assist with the accuracy of the data I am collecting, please reply to this email address with your responses to the questions below and attached curriculum vitae, or complete this google form [URL] by [date].

1. Please indicate your gender:
   - Male
   - Female
   - Non-binary/ third gender
   - Prefer not to say

2. Please indicate your race/ ethnicity:
   - American Indian or Alaskan Native
   - Asian
   - Black
   - Hispanic, Latino/a, or Spanish origin
   - Native Hawaiian/Other Pacific Islander
   - White
   - Other: _____

3. Please upload your most recent curriculum vitae as an attachment

This questionnaire and the upload of your curriculum vitae should take no more than 2-3 minutes of your time to complete. By completing this questionnaire and uploading your CV, you indicate you are at least 18 years of age; you have read this statement of consent or have had it read to you; your questions have been answered to your satisfaction; and you voluntarily agree to participate in this research study.

This study has been approved by the IRB*, and the names and identities of all participants will never be reported in the presentation of findings. All findings that emerge from this study will only ever be presented in the aggregate to protect the confidentiality of the participants. While there are no direct benefits to participants, this research study has the potential to benefit aspiring women and minority leaders by identifying key forms of capital needed for the role of CAO as well as professional affiliations that may aid in their professional development and career advancement.

If you have any questions or I can provide any additional information, please do not hesitate to contact me. I know how busy you are, and I realize that the demands on your time are significant. I thank you for your consideration of this request, as your involvement means a great deal to the success of this project.

Sincerely,

Courtney Lennartz

* IRB Information:
    Principal Investigator: Courtney Lennartz
    Contact Information:
        Institutional Review Board
        University of Maryland
        301-405-4212 (Phone)
    Project: [1577941-1] KEY FORMS OF CAPITAL AND AFFILIATIONS AMONG MEN AND WOMEN CHIEF ACADEMIC OFFICERS OF THE AAU

Appendix B: Measures of Human Capital, Cultural Capital, and Social Capital

	Variable	Description	Operationalization/ Measures	Analyses
Human Capital	**Hypothesis**: Men and women CAOs will have different prior experiences before their appointment as CAO of an AAU institution **Rationale**: Previous research suggests women CAOs are more likely to serve as CAOs prior to their current CAO role, while men tend to serve as dean prior to the role of CAO (ACE, 2016; Johnson, 2017) Women leaders also have to demonstrate a higher level of competence in the hiring process than men (Avolio, Gardner, Walumbwa, Luthans & May, 2004; Eagly & Carli, 2007) suggesting that women may be spending more time in their previous position than men. Yet this research has not been conducted on CAOs at research universities specifically, so this study will examine prior position and time in position to determine whether any gender differences exist in previous experience.			
	Prior Experience	The title of the position each AAU CAO held prior to becoming the CAO of their respective AAU institution	Prior_Pos: Categorize immediate prior position title into 3 buckets: CAO=1, Dean=2, and Other Academic Administrator=3 Gender: 0=Male; 1=Female	**Descriptive statistics**: Frequencies (Prior_Pos), and cross-tabulations (Prior_Pos) by gender **Chi-square**: Examine gender differences of immediate prior position buckets by gender
		Length of time in immediate prior position	Time_Prior_Pos: years (numeric value) Gender: 0=Male; 1=Female	**Descriptive statistics:** Frequencies, mean and mode (Time_Prior_Pos) and cross-tabulation (Time_Prior_Pos) by Gender **T-tests**: Examine gender differences of length or time in prior position by gender
	Hypothesis: The majority of AAU CAOs will be tenured faculty however, women will have longer academic careers before appointment to the role of CAO at an AAU institution compared to men AAU CAOs **Rationale**: The most common career pathway of CAOs is through the faculty ranks. However, women tend to have differential rates of tenure and promotion and are underrepresented at the rank of full professor at research universities in particular (Johnson, 2017; Misra et al., 2011; Niemeier & Gonzalez, 2004; U.S. Department of Education, 2016; West & Curtis, 2006). If women are taking longer to reach the rank of full professor, they are likely to have longer academic careers before their appointment to CAO, or not have obtained tenure before moving into academic administration. As such, tenure status and time in academic career will be examined.			
	Academic career	Tenure status of each AAU CAO	Tenure: 0=No; 1= Yes Gender: 0=Male; 1=Female	**Descriptive statistics:** Frequencies (Tenure), and cross-tabulation (Tenure) by gender **Chi-square**: Examine gender differences of tenure status by gender
		Length of time in academic career from first faculty appointment to AAU CAO appointment	Time_Acad_Career: years (numeric value)	**Descriptive statistics:** Frequencies, mean and mode (Time_Acad_Career) and cross-tabulation (Time_Acad_Career) by Gender

		Gender: 0=Male; 1=Female	**T-tests**: Examine gender differences of length or time in academic career by gender
Hypothesis: Women AAU CAOs will have different academic backgrounds in terms of discipline of terminal degree than men AAU CAOs; More men AAU CAOs will have STEM backgrounds than women AAU CAOs **Rationale**: Women are under-represented in the STEM fields (Bonham & Stefan, 2016; Glass & Minnotte, 2010; Li & Koedel, 2017) however, almost half (48%) of the AAU CAOs have a terminal degree in a STEM field (June & Bauman, 2019). The women AAU CAOs are likely to have different academic backgrounds than the men AAU CAOs as a result. This study will identify other backgrounds/disciplines of the AAU CAOs and identify whether any gender differences exist.			
Academic discipline of terminal degree	The discipline of the terminal degree for each AAU CAO as classified by the CIP codes available in IPEDs	CIP Class_Code_PhD: Each discipline that the CAO's terminal degree is in will be categorized into one of the 54 categories as determined by CIP classifications Gender: 0=Male; 1=Female	**Descriptive statistics:** Frequencies (CIP categories), and cross tabulations (CIP categories by gender) **Chi-square**: Examine gender differences of CIP categories by gender
STEM	STEM designation determined by using the CIP codes of each AAU CAO's terminal degree and NSF STEM designation	STEM: 0=No; 1= Yes Gender: 0=Male; 1=Female	**Descriptive statistics:** Frequencies (STEM), and cross tabulations (STEM by gender) **Chi-square:** Examine gender differences of STEM by gender
Hypothesis: More women AAU CAOs will be internal hires than men AAU CAOs **Rationale**: Women are more likely to be hired internally because they are more likely to serve at one institution/ institution type throughout their career and be promoted within that institution (Cejda & McKenney, 2000). However, hire type has not been examined among CAOs of research universities, or the AAU institutions specifically, so hire type will be examined in this research study to determine whether the majority of AAU CAOs are hired internally or externally, and if any gender differences exist.			
Hire type	Whether each AAU CAO was an internal or external hire for the position of CAO at their respective AAU institution	Hire_Type: 0=Internal, 1= External Gender: 0=Male; 1=Female	**Descriptive statistics**: Frequencies (hire type), and cross-tabulations (hire type by gender) **Chi-square:** Examine gender differences of hire type by gender
Hypotheses: Men AAU CAOs are more likely than women AAU CAOs to have graduated from prestigious academic institutions as indicated by membership in the AAU, membership in the Ivy League, and an R1 Carnegie classification Men AAU CAOs are more likely than women AAU CAOs to have previously worked at a prestigious academic institution as indicated by membership in the AAU, membership in the Ivy League, and an R1 Carnegie classification **Rationale**: There is a ranking system among academic institutions that indicate the prestige of an institution. Research universities with very high research activity (R1 and AAU), as well as old institutions with high selectivity (Ivy League) are often considered the most prestigious (Burris,			

189

Prestige of academic institution affiliations	The name and prestige of each AAU CAO's undergraduate institution as indicated by Carnegie classification, AAU affiliation, and Ivy League affiliation	Undergrad_Inst: Name of undergraduate institution (string variable) Undergrad_R1_Inst: 0=No, 1=Yes Undergrad_Ivy: 0=No, 1=Yes Undergrad_AAU: 0=No, 1=Yes Gender: 0=Male; 1=Female	**Descriptive statistics**: Frequencies (Undergrad_Inst, Undergrad_AAU, Undergrad_R1_Inst, and Undergrad_Ivy), and cross tabulations ((Undergrad_Inst, Undergrad_AAU, Undergrad_R1, and Undergrad_Ivy) by gender **Chi-square**: Examine gender differences of prestige of each AAU CAO's undergraduate institution as indicated by Undergrad_AAU, Undergrad_R1_Inst, and Undergrad_Ivy, by gender
	The name and prestige of each AAU CAO's graduate institution as indicated by Carnegie classification, AAU affiliation, and Ivy League affiliation	Grad_Inst: Name of graduate institution (string variable) Grad_R1_Inst: 0=No, 1=Yes Grad_Ivy: 0=No, 1=Yes Grad_AAU: 0=No, 1=Yes Gender: 0=Male; 1=Female	**Descriptive statistics:** Frequencies (Grad_Inst, Grad_AAU, Grad_R1, and Grad_Ivy), and cross tabulations (Grad_Inst, Grad_AAU, Grad_R1_Inst, and Grad_Ivy), by gender **Chi-square**: Examine gender differences of prestige of each AAU CAO's graduate institution as indicated by Grad_AAU, Grad_R1, and Grad_Ivy by gender
	The name and prestige of each AAU CAO's immediate prior institution of employment as indicated by Carnegie classification, AAU affiliation, and Ivy League affiliation	Prior_Inst_Name: Name of prior institution (string variable) Prior_Carnegie_Class: See Appendix C Prior_R1_Inst: 0=No, 1=Yes Prior_Ivy: 0=No, 1=Yes Prior_AAU: 0=No, 1=Yes Gender: 0=Male; 1=Female	**Descriptive statistics:** Frequencies (Prior_Inst_Name, Prior_AAU, Prior_Carnegie_Class, Prior_R1_Inst, and Prior_Ivy), and cross tabulations (Prior_AAU, Prior_R1_Inst, and Prior_Ivy) by gender **Chi-square**: Examine gender differences of prestige of each AAU CAO's immediate prior institution of employment as indicated by Prior_AAU, Prior_R1_Inst, and Prior_Ivy by gender

Hypothesis: Women AAU CAOs will be concentrated in "lower status" disciplines compared to men AAU CAOs as indicated by Biglan's (1973) typology of Hard-Soft and Pure-Applied disciplines

Cultural Capital		**Rationale**: Women tend to be concentrated in lower status disciplines/ are under-represented in the STEM fields (Cejda, 2008; Twombly, 2007) however, almost half of the AAU CAOs have a terminal degree in a STEM field (June & Bauman, 2019). Certain disciplines are considered higher in status than others. STEM fields are often considered higher status given that they are hard/pure disciplines compared to others which may be softer/applied disciplines (Braxton & Hargins, 1996; Jones, 2011). Thus, hard/pure disciplines may be considered higher status forms of cultural capital that can be leveraged during one's academic career. As such, status of the disciplines will be examined.		
	Status of Discipline	Status of discipline of terminal degree as determined by categorization into high and low status	Disc_Hard_Soft: Each of the 54 CIP classifications for disciplines will be categorized into a four-point scale of Hard to Soft using Biglan's (1973) typology (1=Hard, 2= somewhat hard, 3=somewhat soft, 4= soft) Disc_Pure_Applied: Each of the 54 CIP classifications for disciplines will be categorized into a four-point scale of Pure to Applied using Biglan's (1973) typology (1=Pure, 2= somewhat pure, 3=somewhat applied, 4= applied) Gender: 0=Male; 1=Female	**Descriptive statistics:** Frequencies (Disc_Hard_Soft and Disc_Pure_Applied), and cross tabulations ((Disc_Hard_Soft and Disc_Pure_Applied) by gender **Chi-square**: Examine gender differences of hard/soft and pure/applied by gender
		Hypotheses: Men AAU CAOs will have a greater number of research publications including more first-author and co-authored research publications than women AAU CAOs **Rationale**: CAOs are the head of research enterprise and are generally expected to have a strong scholarly record. The research shows male faculty publish more (Brown & Samuels, 2018; Lone & Hussain, 2017; Strand & Bulik, 2018; Van den Besselaar & Sandström, 2017), and publish more single or first author research papers which are considered higher in status (Roverst & Verhoef, 2016). Women tend to have less time to devote to research (Link, Swann & Bozeman, 2008; Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva & Nyunt, 2017). As such, the total number of research publications and number of research publications as first author among the AAU CAOs will be examined.		
	Research publications	The total number of research publications and number of research publications as first author at time of appointment to CAO	Num_Pubs: Total number of research publications (numeric value) Num_Pubs_First: Total number of research publications as first author (numeric value) Gender: 0=Male; 1=Female	**Descriptive statistics**: Frequencies, mean, mode (Num_Pubs and Num_Pubs_First) and cross-tabulations ((Num_Pubs and Num_Pubs_First) by gender **T-tests**: Mean Num_Pubs and Num_Pubs_First by gender
		Hypothesis: Men AAU CAOs will have a higher H-index score than women AAU CAOs		

	Rationale: A high h-index is a reliable indicator of research accomplishment, and is a useful way to compare the impact of one's research productivity against other researchers regardless of discipline (Hirsch, 2005) as it combines the effects of quantity (number of publications) and quality (number of citations). Given that men tend to have a greater number of research publications and are more highly concentrated in hard disciplines where research findings are more generalizable and thus may be cited by other researchers more often than those in other disciplines, I hypothesize men are likely to have higher h indices than women who are more likely to be in soft disciplines. As such, the h index of the AAU CAOs, and whether any gender differences exist, will be examined.			
	H-index	The H-index score of each AAU CAO	h_index: numeric value	**Descriptive statistics**: Frequencies, mean, mode (h_index) and cross-tabulations (h_index) by gender **T-tests**: Mean h_index by gender
	Hypothesis: Men AAU CAOs will have a greater mean total dollar amount of research grants and a greater overall number of research grants than women AAU CAOs **Rationale**: The CAO manages the budget and oversees the research direction of the institution. Research grants also bring prestige to the researcher and their institution. As a result, evidence of managing large grants may be a key form of cultural capital for an AAU CAO. Men tend to spend more time on research than women (Misra et al., 2011; Mitchell & Hesli, 2013; O'Meara, Kuvaeva & Nyunt, 2017) resulting in more time to apply for research grants and have greater representation in the STEM disciplines which typically have the highest grant award dollar values. Furthermore, gender bias among grant applications tends to favor men suggesting men will have a greater number of grant awards than women (Lerback and Hanson 2017; Magua et al., 2017; Sheridan et al., 2017). As such, gender differences in total number of and dollar amount of research grants awarded to the AAU CAOs will be examined.			
	Research grants	The total dollar amount of all research grants each AAU CAO has been awarded	Total_Grants: Total dollar amount of all research grants (numeric value) Gender: 0=Male; 1=Female	**Descriptive statistics**: Frequencies, mean, mode (Total_Grants), and cross-tabulations of mean and mode (Total_Grants) by gender **T-tests**: Mean Total_Grants by gender
		The total number of research grants each AAU CAO has been awarded	Num_Grants: Total number of research grants (numeric value) Gender: 0=Male; 1=Female	**Descriptive statistics**: Frequencies, mean, mode (Num_Grants), and cross-tabulations of mean and mode (Num_Grants) by gender **T-tests**: Mean Num_Grants by gender
Social Capital	**Hypothesis:** The AAU CAOs will have membership in multiple professional organizations, and there will be common affiliations among them **Rationale:** Multiple professional organization affiliations results in greater social capital in terms of more potential network connections and broader interactions with individuals in and across networks (Stoloff et al., 1999; Wollebaek & Selle, 2002). Commonalities among the AAU CAO's professional organization affiliations could indicate a potential professional network that has been influential in achieving the position of CAO. Such commonalities in professional organization membership among the AAU CAOs will be examined.			

Professional organization affiliations	The names of the professional organizations each AAU CAO is affiliated with	Organization_1: String, Organization_2: String, etc. Gender: 0=Male; 1=Female	**Descriptive statistics:** Frequencies (Organization_1, Organization_2, etc.), mode, and cross-tabulations (Organization_1, Organization_2, etc.) by gender
Hypothesis: The AAU CAOs will have multiple academic institution affiliations, and there will be common affiliations among them **Rationale:** Multiple institution affiliations results in greater social capital in terms of more network connections and broader interactions with individuals in and across networks (Stoloff et al., 1999; Wollebaek & Selle, 2002). Commonalities among the AAU CAO's institution affiliations could potentially indicate a professional network that has been influential in achieving the position of CAO. Such commonalities in institutional affiliations among the AAU CAOs will be examined.			
Academic institution affiliations	The name of each AAU CAO's immediate prior institution of employment	Prior_Inst_Name: Name of prior institution (string variable) Gender: 0=Male; 1=Female	**Descriptive statistics:** Frequencies and modes (Prior_Inst_Name, Grad_Inst, Undergrad_Inst), and cross-tabulations of highest modes (Prior_Inst_Name, Grad_Inst, Undergrad_Inst) by gender
	The name of each AAU CAO's undergraduate institution	Undergrad_Inst: Name of undergraduate institution (string variable) Gender: 0=Male; 1=Female	
	The name of each AAU CAO's terminal degree graduate institution	Grad_Inst: Name of graduate institution (string variable) Gender: 0=Male; 1=Female	

Appendix C: Carnegie Classification Descriptions

Doctoral Universities	R1: Doctoral Universities – Very high research activity
	R2: Doctoral Universities – High research activity
	D/PU: Doctoral/Professional Universities
Master's Colleges and Universities	M1: Master's Colleges and Universities – Larger programs
	M2: Master's Colleges and Universities – Medium programs
	M3: Master's Colleges and Universities – Smaller programs
Baccalaureate Colleges	Arts & Sciences Focus
	Diverse Fields

Source: http://carnegieclassifications.iu.edu/classification_descriptions/basic.php

Appendix D: Classification of Disciplines using Biglan's 1973 Typology

Academic Discipline CIP Classification	Hard-Soft	Pure-Applied
Agricultural Economics	3	3
Agronomy and Crop Science	2	3
Animal Sciences, General	2	3
Applied Horticulture/Horticulture Operations, General	1	3
City/Urban, Community and Regional Planning	N/A	4
Asian Studies/Civilization	4	1
Communication, General	4	3
Computer and Information Sciences, General	2	3
Computer Science	2	3
Art Teacher Education	4	4
Curriculum and Instruction	4	4
Educational Leadership and Administration, General	4	4
Special Education and Teaching, General	4	4
Aerospace, Aeronautical and Astronautical/Space Engineering	1	3
Bioengineering and Biomedical Engineering	1	3
Chemical Engineering	1	3
Civil Engineering, General	1	3
Electrical and Electronics Engineering	1	3
Engineering, General	1	3
Environmental/Environmental Health Engineering		4
Industrial Engineering	1	3
Materials Engineering	1	3
Materials Science	2	2
Mechanical Engineering	2	3
Nuclear Engineering	2	3
Operations Research		3
Polymer/Plastics Engineering	1	3
Systems Engineering	2	3
Biological/Biosystems Engineering	1	3
Comparative Literature	4	1
German Language and Literature	4	1
Linguistics	2	2
Spanish Language and Literature	4	1
English Language and Literature, General	4	1
Humanities/Humanistic Studies	3	3
Biochemistry	1	2
Biochemistry and Molecular Biology	1	2
Biology/Biological Sciences, General	2	2
Developmental Biology and Embryology	2	2
Entomology	2	2
Exercise Physiology	2	2
Immunology	2	2
Medical Microbiology and Bacteriology	1	2
Microbiology, General	1	2
Neurobiology and Behavior	2	2
Neuroscience	2	2
Oncology and Cancer Biology	N/A	4

Pathology/Experimental Pathology	N/A	4
Pharmacology	N/A	4
Pharmacology and Toxicology	N/A	4
Physiology, General	2	2
Zoology/Animal Biology	1	2
Evolutionary Biology	2	2
Mathematics, General	2	1
Statistics, General	2	1
Biopsychology	3	2
Philosophy	4	1
Astronomy	1	2
Atomic/Molecular Physics	1	1
Chemical Physics	1	1
Chemistry, General	1	1
Geochemistry and Petrology	1	2
Geology/Earth Science, General	1	2
Geophysics and Seismology	1	2
Inorganic Chemistry	1	1
Materials Science	2	2
Nuclear Physics	2	1
Physical Chemistry	2	1
Physics, General	2	1
Theoretical and Mathematical Physics	2	1
Physics, Other	1	1
Meteorology	2	2
Clinical Psychology	3	4
Cognitive Psychology and Psycholinguistics	3	2
Developmental and Child Psychology	3	2
Educational Psychology	4	3
Experimental Psychology	3	2
Physiological Psychology/Psychobiology	2	2
Psychology, General	3	2
Social Psychology	3	2
Public Administration	4	2
Public Policy Analysis, General	4	2
Anthropology	3	2
Criminology		3
Economics, General	4	2
Geography	N/A	N/A
Medical Anthropology	3	2
Political Science and Government, General	4	2
Sociology	4	2
International Relations and Affairs	4	2
Art History, Criticism and Conservation	4	2
Audiology/Audiologist and Speech-Language Pathology/Pathologist	4	4
Pathology/Pathologist Assistant	2	4
Accounting	3	4
Finance, General	3	4
Marketing/Marketing Management, General	3	4

Organizational Behavior Studies	N/A	3
European History	4	1
History, General	4	1
Public/Applied History	4	2
Law	N/A	4
Medicine	N/A	4

Appendix E: What We Know About Women Chief Academic Officers

Among the AAU institutions CAOs, 75% are male and white, almost half have a PhD in a STEM field, and 89% earned their degrees from an AAU institution	June & Bauman, 2019
54% of AAU CAOs previously served as a dean or had dean in their title	June & Bauman, 2019
Prior experience: women and men tend to have held different roles within the academy - women have previous CAO experience (42%) - men have previous academic dean or other campus executive in academic affairs experience (29.4%)	ACE, 2016; Johnson, 2017
Percentage of women serving in a CAO position has declined from 2008 to 2013 in doctoral degree-granting institutions	Johnson, 2017
Women are underrepresented at doctoral universities - doctoral institutions employ a significant percentage (47%) of fulltime faculty members and are the most prestigious institutions within higher education	Johnson, 2017; West & Curtis, 2006
Women are more likely to hold a degree in education or higher education than men CAOs (38.6% compared to 26.2%)	Johnson, 2017
CAOs most often hold a doctoral degree in the humanities, fine arts, or religion, the STEM fields, or the social sciences	ACE, 2013
The most common path to the role of CAO is through the faculty ranks - Department Chair -> Dean -> CAO	ACE, 2013, 2007; Kelly, 2011
Women faculty are underrepresented in research universities; only 37.4% of tenure-track faculty are women	Johnson, 2017; US Department of Education, 2016
Only 26% of full professors at R1 institutions are women	Gonzalez, 2001; Niemeier & Gonzalez, 2004; West & Curtis, 2006
Women are underrepresented as Department Chairs	Niemeier & Gonzalez, 2004
Tenure is a strong predictor for CAO and President	Chilwniak, 1997
Women CAOs are less likely to aspire to presidency roles (27 percent versus 35 percent for men)	ACE, 2013
Women CAOs are less likely to serve multiple institutions on their pathway to becoming CAOs compared to men - women are more likely to be promoted within their institutions into other administrative jobs	ACE, 2013, 2009; Kelly, 2011
Institutions with female presidents and chief academic officers, as well as a greater percentage of women on their boards of trustees, experience larger increases in the growth of women faculty than other institutions	Ehrenberg, Jakubson, Martin, Main & Eisenberg, 2009

Professional development opportunities such as participating in state or regional leadership programs; serving as a board member for a state or regional professional association; partaking in institutional staff development programs; and serving on both internal and external committees are important to women CAO advancement.	Cejda, 2006; Kelly, 2011
There are more women CAOs in community colleges than other institutional types because women are more often employed at these "lower status" institutional types	Moore & Sangria, 1991; Cejda, 2008; Twombly, 2007

Appendix F: Similar Studies to Date

June & Bauman, 2019	Conducted a study of 201 current and former CAOs at the 60 AAU institutions. Findings: – 75% are male – Majority are white – Almost half have a PhD in a STEM field, 16% in engineering – Most provosts served as dean, or had dean in their title, before becoming CAO (54%) – 89% earned their PhD from an AAU institution – Almost 2/3 were internal hires – Almost 12% were appointed to institutions where they were a graduate student – 60% of the 41 AAU CAOs that became Presidents did so at AAU institutions
Kelly, 2011	Explored the overall phenomenon of serving as a female CAO, including necessary skills for the position, job challenges and satisfactions as well as issues surrounding the transition into administration. Also examined the roles that gender, family finances and race played in the pursuit of their educational and professional goals, and the factors that impacted their career progression and job performance, focusing on the barriers and facilitators that affected them. – Qualitative phenomenological research design Findings: – Relationship with the president is important for facilitating advancement and during the role of CAO – Half actively sought promotions and half lacked deliberateness in their professional development/ career progression to CAO – Participated in professional development – Child care responsibilities impacted their professional lives – Mentors aided in career progression – Academic discipline prepared them for administrative work but in some cases lacked "cache" because it was an applied field – Scholarship and remaining active in field built credibility; lack of a scholarly record is an impediment in job search – Determination to succeed – Skills: managerial, calmness, communication – Feelings of isolation – Feelings of needing more experience and confidence – Geographically bound – Need for a formal network to consult

Keim & Murray, 2008	Conducted a study of 300 randomly selected community college CAOs to determine the educational backgrounds and demographic characteristics of these administrators.
	Findings:
	   − More males than females among those CAOs not possessing a doctorate or JD
	   − 66% held doctorates in the field of education and 72 held doctorates in other disciplines
	   − 66% or 138 dissertations dealt with education, 74 specifically focused on community college issues
	   − Six universities graduated 17.6% of the CAOs in the sample

Dean, 2008	Used a quantitative survey method to find the majority of women academic leaders across institutional type did not desire the presidency, and CAOs at associate's and doctoral institutions received more mentoring than colleagues at baccalaureate and master's institutions.
Cejda, 2008	Six female chief academic officers (CAOs) discuss their community college employment, the issues and challenges experienced in obtaining a chief academic officer position, personal development of skills and abilities to be successful in their positions, the recommendations they would share with aspiring and new CAOs. Importance of peers and supervisors in encouraging progression, cc environment supported movement of women in the academic hierarchy, having faculty experience and serving on committees was essential to the role of CAO, professional development opportunities were helpful at career advancement and developing a network.
Cejda, 2006	Conducted a survey of women cc CAOs perceived importance of professional development opportunities. Participating in state or regional leadership programs; serving as a board member for a state or regional professional organization; participating in institutional staff development programs; serving on institutional committees, task forces, or commissions; and accepting additional administrative responsibilities were cited as most important.

References

Adler, N. J., & Izraeli, D. N. (1994). *Competitive frontiers*. Blackwell.

Aguinis, H., Ji, Y. H., & Joo, H. (2018). Gender productivity gap among star performers in STEM and other scientific fields. *Journal of Applied Psychology*, *103*(12), 1283.

Aguirre, A. (2000). *Women and minority faculty in the academic workplace: Recruitment, retention and academic culture*. Jossey-Bass.

Aksnes, D. W. (2006). Citation rates and perceptions of scientific contribution. *Journal of the Association for Information Science and Technology, 57,* 169–185.

Ali, M. M., Bhattacharyya, P., & Olejniczak, A. J. (2010). The effects of scholarly productivity and institutional characteristics on the distribution of federal research grants. *The Journal of Higher Education*, *81*(2), 164-178.

Alonso, S., Cabrerizo, F. J., Herrera-Viedma, E., & Herrera, F. (2009). h-Index: A review focused in its variants, computation and standardization for different scientific fields. *Journal of Informetrics*, *3*(4), 273-289.

American Council on Education. (2013a). CAO Background [Infographic from ACE, 2013-14, CAO Census Survey]. Retrieved from http://www.acenet.edu/news-room/Pages/Chief-Academic-Officer-Survey.aspx

American Council on Education. (2013b). CAO Professional Pathways [Infographic from ACE, 2013-14, CAO Census Survey]. Retrieved from http://www.acenet.edu/news-room/Pages/Chief-Academic-Officer-Survey-.aspx

American Council on Education. (2013c). Women CAOs [Infographic from ACE, 2013-14, CAO Census Survey]. Retrieved from http://www.acenet.edu/news-room/Pages/Chief-Academic-Officer-Survey-Women-CAOs.aspx

American Council on Education. (2007). *The American College President 2007*. American Council on Education: Washington, DC.

American Council on Education. (2009). *The CAO census: A national profile of chief academic officers.* American Council on Education: Washington, DC.

American Council on Education. (2012). *The American College President 2012*. American Council on Education: Washington, DC.

American Council on Education. (2017). *American College President Study 2017*. American Council on Education: Washington, DC.

Amey, M. J., & VanDerLinden, K. E. (2002). *Career Paths for Community College Leaders. Research Brief.* (Report no. AACC-RB-02-02). American Association of Community Colleges.

Amey, M. J., VanDerLinden, K. E., & Brown, D. F. (2002). Perspectives on community college leadership: Twenty years in the making. *Community College Journal of Research & Practice, 26,* 573-589.

Ashkenas, J., Park, H., & Pearce, A. (2017, August). *Even with affirmative action, Blacks and Hispanics are more underrepresented at top colleges than 35 years ago.* New York Times. https://www.nytimes.com/interactive/2017/08/24/us/affirmative-action.html

Avolio, B. J., Gardner, W. L., Walumbwa, F. O., Luthans, F., & May, D. R. (2004). Unlocking the mask: A look at the process by which authentic leaders impact follower attitudes and behaviors. *The leadership Quarterly*, *15*(6), 801-823.

Babcock, L., & Laschever, S. (2003). *Women don't ask: Negotiation and the gender divide*. Princeton University Press.

Babcock, L., Recalde, M. P., & Vesterlund, L. (2017). Gender differences in the allocation of low-promotability tasks: The role of backlash. *American Economic Review*, *107*(5), 131-35.

Baez, B. (2000). Race-related service and faculty of color: Conceptualizing critical agency in academe. *Higher Education*, *39*(3), 363-391.

Bain, O., & Cummings, W. (2000). Academe's glass ceiling: Societal, professional-organizational, and institutional barriers to the career advancement of academic women. *Comparative Education Review*, *44*(4), 493-514.

Ballout, H. I. (2007). Career success: The effects of human capital, person-environment fit and organizational support. *Journal of Managerial Psychology*, *22*(8), 741-765.

Barber, L. A. (1995). US women in science and engineering, 1960–1990: Progress toward equity?. *The Journal of Higher Education*, *66*(2), 213-234.

Barrett, L., & Barrett, P. (2011). Women and academic workloads: Career slow lane or cul-de sac? *Higher Education*, *61*, 141–155.

Bartol, K. M., & Zhang, X. (2007). Networks and leadership development: Building linkages for capacity acquisition and capital accrual. *Human Resource Management Review*, *17*(4), 388-401.

Bayer, A. E., & Astin, H. S. (1968). Sex differences in academic rank and salary among science doctorates in teaching. *Journal of Human Resources*, 191-200.

Beasley, T. M., & Schumacker, R. E. (1995). Multiple regression approach to analyzing contingency tables: Post hoc and planned comparison procedures. *The Journal of Experimental Education*, *64*(1), 79-93.

Becher, T. & Trowler, P. R. (1989). *Academic tribes and territories*. SRHE.

Becher, T. & Trowler, P. R. (2001). *Academic tribes and territories*. McGraw-Hill Education (UK).

Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis, with a special reference to education.* University of Chicago Press.

Beddoes, K., & Pawley, A. L. (2014). Different people have different priorities: Work-family balance, gender, and the discourse of choice. *Studies in Higher Education*, *39*(9), 1573–1585.

Beddoes, K., Schimpf, M. C. M., & Pawley, A. L. (2014, June). *New Metaphors for New Understandings: Ontological Questions about Developing Grounded Theories in Engineering Education*. Paper presented at the American Society for Engineering Education Annual Conference, Indianapolis, IN.

Bedeian, A., Cavazos, D., Hunt, J., & Jauch, L. (2010). Doctoral degree prestige and the academic marketplace: A study of career mobility within the management discipline. *Academy of Management Learning and Education*, 9(1), 11-25.

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*, 807-821.

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

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

Bensimon, E. M., Ward, K., & Sanders, K. (2000). *The Department Chair's Role in Developing New Faculty into Teachers and Scholars*. Anker Publishing Company, Inc.

Bentley, J. T., & Adamson, R. (2003). *Gender Differences in the Careers of Academic Scientists and Engineers: A Literature Review*. (Special Report). National Science Foundation. http://www.nsf.gov/sbe/srs/nsf03322/pdf/nsf03322.pdf.

Berger, J. B. (2000). Optimizing capital, social reproduction, and undergraduate persistence: A sociological perspective. In J. M. Braxton (Ed.), *Reworking the student departure puzzle* (pp. 95-126). Nashville, TN: Vanderbilt University Press.

Bettinger, E. P., & Long, B. T. (2005). Do faculty serve as role models? The impact of instructor gender on female students. *American Economic Review*, *95*(2), 152-157

Beutel, A. M., & Nelson, D. J. (2005). The gender and race-ethnicity of faculty in top science and engineering research departments. *Journal of Women and Minorities in Science and Engineering*, *11*(4).

Bickel, J., Wara, D., Atkinson, B. F., Cohen, L. S., Dunn, M., Hostler, S., Johnson, T. R. B., Morahan, P., Rubenstein, A. H., Sheldon, G. F., & Stokes, E. (2002). Increasing women's leadership in academic medicine: report of the AAMC Project Implementation Committee. *Academic Medicine*, *77*(10), 1043-1061.

Biglan, A. (1973). The characteristics of subject matter in different academic areas. *Journal of Applied Psychology,* 57, 195-203.

Bilimoria, D., Joy, S., & Liang, X. (2008). Breaking barriers and creating inclusiveness: Lessons of organizational transformation to advance women faculty in academic science and engineering. *Human Resource Management, 47*, 423–441.

Bird, S., Litt, J., & Wang, Y. (2004). Creating Status of Women Reports: Institutional Housekeeping as 'Women's Work'. *NWSA Journal 16*(1), 194-206.

Birnbaum, R. (1988). Presidential searches and the discovery of organizational goals. *The Journal of Higher Education*, *59*(5), 489-509.

Blackburn, H. (2017). The status of women in STEM in higher education: A review of the literature 2007–2017. *Science & Technology Libraries, 36*(3), 235-273.

Blackmore, P. (2015). *Prestige in academic life: Excellence and exclusion*. Routledge.

Blackmore, P., & Kandiko, C. B. (2011). Motivation in academic life: A prestige economy. *Research in Post-compulsory Education*, *16*(4), 399-411.

Blackwell, J. E. (1989). Mentoring: An action strategy for increasing minority faculty. *Academe*, *75*(5), 8-14.

Blaine, B. E. (2013). Understanding race, racial stereotypes, and racism. In B. E. Blaine (Ed.), *Understanding the psychology of diversity* (2nd ed., pp. 87–112). Sage Publications, Inc.

Blair-Loy, M., Rogers, L. E., Glaser, D., Wong, Y. L., Abraham, D., & Cosman, P. C. (2017). Gender in engineering departments: Are there gender differences in interruptions of academic job talks?. *Social Sciences*, *6*(29), 1-19.

Bland, C. J., Center, B. A., Finstad, D. A., Risbey, K. R. & Staples, J. G. (2005). Theoretical, practical, predictive model of faculty and department research productivity. *Academic Medicine, 80*(3), 225–237.

Blau, F., Ferber, M., & Winkler, A. (2002). *The Economics of Women, Men And Work* (4th ed.). Prentice-Hall.

Blau, F. D., Currie, J. M., Croson, R. T., & Ginther, D. K. (2010). Can mentoring help female assistant professors? Interim results from a randomized trial. *American Economic Review*, *100*(2), 348-52.

Boice, R. (1993). Early Turning Points in Professorial Careers of Women and Minorities. *New Directions for Teaching and Learning*, *53*, 71-79.

Bonham, K. S., & Stefan, M. I. (2016). Gender disparity in computational biology research publications. *BioRxiv*, 070631.

Bornmann, L., & Daniel, H. D. (2007). What do we know about the h index?. *Journal of the American Society for Information Science and Technology*, *58*(9), 1381-1385.

Bourdieu, P. (1986). The forms of capital. In J. Richardson (Ed.), *Handbook of Theory and Research for the Sociology of Education* (pp. 241-258). Greenwood.

Bowen, W. G. (2010). *Lessons learned: Reflections of a university president*. Princeton University Press.

Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of management journal*, *47*(6), 795-817.

Britton, D. M. (2017) Beyond chilly climate: The salience of gender in womens academic careers. *Gender and Society, 31* (1), 5-27.

Britton, D. M. (2010). Engendering the university through policy and practice: Barriers to promotion to full professor for women in the science, engineering, and math disciplines. *Gender Change in Academia*, 15-26.

Britton, D. M. (2009, February). *Engendering the university through policy and practice: Barriers to promotion to full professor for women in the science, engineering, and math disciplines.* Paper presented at the International Conference at the Georg-August-Universitat, Gottingen, Germany.

Brown, N. E., & Samuels, D. (2018). Introduction to gender in the journals, continued: Evidence from five Political Science journals. *PS: Political Science & Politics*, *51*(4), 847-848.

Buckley, L. M., Sanders, K., Shih, M., Kallar, S., & Hampton, C. (2000). Obstacles to promotion? Values of women faculty about career success and recognition. *Academic Medicine*, *75*(3), 283–288.

Burke, R. J., & Mattis, M. C. (Eds.). (2007). *Women and minorities in science, technology, engineering, and mathematics: Upping the numbers*. Edward Elgar Publishing.

Burris, V. (2004). The academic caste system: Prestige hierarchies in PhD exchange networks. *American Sociological Review, 69*(2), 239–264.

Callier, V., Singiser, R. H., & Vanderford, N. L. (2015). The parlous state of academia: When politics, prestige and proxies overtake higher education's teaching mission. *Australian Universities' Review*, *57*(1), 13.

Carli, L. L. (2001). Gender and social influence. *Journal of Social Issues*, *57*(4), 725-741.

Carr, R. (2013). *Women in the academic pipeline for science, technology, engineering, and math: Nationally and at AAUDE institutions.* Washington, DC: Association of American Universities Data Exchange.

Carrell, S. E., Page, M. E., & West, J. E. (2010). Sex and science: How professor gender perpetuates the gender gap. *The Quarterly Journal of Economics*, *125*(3), 1101-1144.

Carrigan, C., Quinn, K., & Riskin, E. A. (2011). The gendered division of labor among STEM faculty and the effects of critical mass. *Journal of Diversity in Higher Education*, *4*(3), 131.

Cejda, B. D., & McKenney, C. B. (2000). Boundaries of an administrative labor market: The chief academic officer in public community colleges. *Community College Journal of Research & Practice, 24(*8), 615-625.

Cejda, B.D. (2008). In their own words: Women chief academic officers discuss the community college and their career experiences. *Journal of Women in Educational Leadership, 6*(3), 171-185.

Chilwniak, L., (1997). *Higher Education Leadership: Analyzing the Gender Gap.* ERIC Clearinghouse on Higher Education. Washington University: Washington, DC

Christakis, N. A., & Fowler, J. H. (2009). *Connected: The surprising power of our social networks and how they shape our lives*. Little, Brown Spark.

Clauset, A., Arbesman, S., & Larremore, D. B. (2015). Systematic inequality and hierarchy in faculty hiring networks. *Science Advances*, *1*(1), e1400005.

Clemens, E. S., Powell, W., Mcllwaine, K., & Okamoto, D. (1996). Careers in print: Books, journals and scholarly reputations. *American Journal of Sociology, 101*, 433- 494.

Cloverpop. (2017). Hacking Diversity with Inclusive Decision Making. White Paper. Retrieved from: https://www.cloverpop.com/hacking-diversity-with-inclusive-decision-making-white-paper.

Coate, K., & Howson, C. K. (2016). Indicators of esteem: Gender and prestige in academic work. *British Journal of Sociology of Education*, *37*(4), 567-585.

Cole, J. R., & Zuckerman, H. (1984). The productivity puzzle. Advances in Motivation and Achievement. In Steinkamp, M.W., & Maehr, M.L. (Eds.), *Advances in Motivation and Achievement: Women in Science.* JAI Press.

Combes, P. P., Linnemer, L., Visser, M. (2008) Publish or peer-rich? The role of skills and networks in hiring economics professors. *Labour Economics,* 15(3), 423–441.

Conley, D. T. (2005). College knowledge: Getting in is only half the battle. *Principal Leadership*, *6*(1), 16-21.

Conrad, P., Carr, P., Knight, S., Renfrew, M. R., Dunn, M. B., & Pololi, L. (2010). Hierarchy as a barrier to advancement for women in academic medicine. *Journal of Women's Health*, *19*(4), 799-805.

Corley, E., Bozeman, B., & Gaughan, M. (2003). Evaluating the impacts of grants on women scientists' careers: the curriculum vitae as a tool for research assessment. In *Learning from Science and Technology Policy Evaluation: Experiences from the US and Europe* (293-315). Edward Elgar Publishing.

Costas, R., & Bordons, M. (2007). The h-index: Advantages, limitations and its relation with other bibliometric indicators at the micro level. *Journal of Informetrics*, *1*(3), 193-203.

Creamer, E. G. (1998). *Assessing Faculty Publication Productivity: Issues of Equity. ASHE-ERIC Higher Education Report* (Volume 26, Number 2). ERIC Clearinghouse on Higher Education.

Creary, (2020, August). *Why Inclusion Starts in the C-suite.* Wharton School of Business, University of Pennsylvania. https://knowledge.wharton.upenn.edu/article/why-inclusion-starts-in-the-c-suite/

Cress, C. M., & Hart, J. (2009). Playing soccer on the football field: The persistence of gender inequities for women faculty. *Equity & Excellence in Education*, *42*(4), 473-488.

Cresswell, J. W. (1985). *Faculty research performance: Lessons from the sciences and the social sciences* (ASHE-ERIC Higher Education Report, No. 4). ASHE.

Cronin, B., & Meho, L. (2006). Using the h-index to rank influential information scientists. *Journal of the American Society for Information Science and Technology*, *57*(9), 1275-1278.

Damaske, S., Ecklund, E. H., Lincoln, A. E., & White, V. J. (2014). Male scientists' competing devotions to work and family: Changing norms in a male-dominated profession. *Work and Cccupations*, *41*(4), 477-507.

Dannels, S. A., McLaughlin, J. M., Gleason, K. A., Dolan, T. A., McDade, S. A., Richman, R. C., & Morahan, P. S. (2009). Dental school deans' perceptions of the organizational culture and impact of the ELAM program on the culture and advancement of women faculty. *Journal of Dental Education*, *73*(6), 676-688.

Dean, D. R. (2008). Resources, role models, and opportunity makers: Mentoring women in academic leadership. In Dean, D. R., Bracken, S. J. & Allen, J. K. (Eds). *Women in academic leadership: Professional choices, personal strategies* (pp. 8-30). Stylus.

Del Favero, M. (2005). The social dimension of academic discipline as a discriminator of academic deans' administrative behaviors. *The Review of Higher Education*, *29*(1), 69-96.

Delanty, G. (2001). *Challenging knowledge: The university in the knowledge society*. Open University Press.

Denson, N., Szelényi, K., & Bresonis, K. (2018). Correlates of work-life balance for faculty across racial/ethnic groups. *Research in Higher Education*, *59*(2), 226-247.

Dezsö, C. L., & Ross, D. G. (2012). Does female representation in top management improve firm performance? A panel data investigation. *Strategic Management Journal, 33*(9), 1072-1089.

Dimov, D. P., & Shepherd, D. A. (2005). Human capital theory and venture capital firms: exploring "home runs" and "strike outs". *Journal of Business Venturing*, *20*(1), 1-21.

DiRamio, D., Theroux, R., & Guarino, A. J. (2009). Faculty hiring at top-ranked higher education administration programs: An examination using social network analysis. *Innovative Higher Education, 34*, 149– 159.

Dovidio, J. F. (2001). On the nature of contemporary prejudice: The third wave. *Journal of Social Issues, 57(4*), 829–849.

Dunham-Taylor, J., Lynn, C. W., Moore, P., McDaniel, S., & Walker, J. K. (2008). What goes around comes around: Improving faculty retention through more effective mentoring. *Journal of Professional Nursing*, *24*(6), 337-346.

Dutt, K., Pfaff, D. L., Bernstein, A. F., Dillard, J. S., & Block, C. J. (2016). Gender differences in recommendation letters for postdoctoral fellowships in geoscience. *Nature Geoscience*, *9*(11), 805-808.

Eagan Jr, M. K., & Garvey, J. C. (2015). Stressing out: Connecting race, gender, and stress with faculty productivity. *The Journal of Higher Education*, *86*(6), 923-954.

Eagly, A. H. (1987). *Sex differences in social behavior: A social role interpretation.* Erlbaum.

Eagly, A. H., & Carli, L. L. (2007). *Through the labyrinth: The truth about how women become leaders*. Harvard Business Press.

Eagly, A. H., & Karau, S. J. (2002). Role congruity theory of prejudice toward female leaders. *Psychological Review, 109(3*), 573.

Eagly, A. H., Johannesen-Schmidt, M. C., & Van Engen, M. L. (2003). Transformational, transactional, and laissez-faire leadership styles: a meta-analysis comparing women and men. *Psychological Bulletin*, *129*(4), 569.

Eaton, A. A., Saunders, J. F., Jacobson, R. K., & West, K. (2019). How gender and race stereotypes impact the advancement of scholars in STEM: Professors' biased evaluations of physics and biology post-doctoral candidates. *Sex Roles*, 1-15.

Eckel, P. D., & Kezar, A. J. (2003). *Taking the reins: Institutional transformation in higher education*. Greenwood Publishing Group.

Eddy, P. L. (2008). Reflections of women leading community colleges. *The Community College Enterprise, 74*(1), 49-66.

Eddy, P. L. & Cox, E. M. (2008). Gendered leadership: An organizational perspective. *New Directions for Community Colleges, 142*, 69-79.

Ehrenberg, R.G., Jakubson, G.H., Martin, M.L., Main, J.B., & Eisenberg, T. (2009). *Do trustees and administrators matter?: Diversifying the faculty across gender lines.* Cornell Higher Education Research Institute.

Erhardt, N. L., Werbel, J.D. & Shrader, C.B.. (2003). Board of director diversity and firm financial performance. *Corporate Governance: An International* Revie*w, 11*, 102–111.

Eshelman, D. J., Sullivan, K. L., Parker, L., & Levin, D. C. (2000). The Relationship of Clinical and Academic Productivity in a University Hospital Radiology Department. *American Journal of Radiology, 174*, 27–31.

Etzkowitz, H., Kemelgor, C., Neuschatz, M., Uzzi, B. and Alonzo, J. (1994). The paradox of critical mass for women in science. *Science, 266,* 51–3.

Etzkowitz, H., Kemelgor, C., Neuschatz, M., & Uzzi, B. (2000). *Athena Unbound: The Advancement of Women in Science and Technology*. Cambridge UP.

Fabianic, D. (2011). PhD program prestige and faculty location in criminal justice and sociology programs. *Journal of Criminal Justice Education, 22*(4), 562-577.

Fairweather, J. S. (2002). The mythologies of faculty productivity: Implications for institutional policy and decision making. *The journal of Higher Education*, *73*(1), 26-48.

Farnum, R. (1990). Patterns of upper-class education in four American cities: 1875-1975. *The High-Status Track*, 53-73.

Finkelstein, M. J., Conley, V. M., Schuster, J. H. (2016). *Taking the measure of faculty diversity*. TIAA Institute.

Fisher, V., & Kinsey, S. (2014). Behind closed doors! Homosocial desire and the academic boys club. *Gender in Management: An International Journal*, *29*(1), 44-64.

Fons, A. M. (2004). *Chief academic officers in public community colleges: An analysis of leadership attributes* [Unpublished doctoral dissertation]. Texas Tech University.

Franceschet, M. (2010). The difference between popularity and prestige in the sciences and in the social sciences: A bibliometric analysis. *Journal of Informetrics*, *4*(1), 55-63.

Francoeur, C., R. Labelle & B. Sinclair-Desgagné (2008). Gender diversity in corporate governance and top management. *Journal of Business Ethics*, *81*, 83–95.

Freeman Jr, S., & DiRamio, D. (2016). Elitism or pragmatism? Faculty hiring at top graduate programs in higher education administration. *Journal of the Professoriate*, *8*(2), 94-127.

Fowler, J. H., Grofman, B., & Masuoka, N. (2007). Social networks in political science: hiring and placement of Ph. Ds, 1960-2002. *PS: Political Science and Politics*, *40*(4), 729-739.

Fox, M. F. (1992). Research, teaching, and publication productivity: Mutuality versus completion in academia. *Sociology of Education, 65(*4), 293–305.

Fox, M. F., Colatrella, C., McDowell, D., & Realff, M. L. (2007). Equity in tenure and promotion: An integrated institutional approach. In Stewart, A., Malley, J., & LaVaque-Manty, D. (Eds.), *Transforming science and engineering: Advancing academic women* (pp. 170-186). University of Michigan Press.

Furst-Holloway, S., & Miner, K. (2019). ADVANCEing women faculty in STEM: empirical findings and practical recommendations from National Science Foundation ADVANCE institutions. *Equality, Diversity and Inclusion: An International Journal, 38*(2), 122-130.

Garcia-Perez, M. A., & Nunez-Anton, V. (2003). Cellwise residual analysis in two-way contingency tables. *Educational and Psychological Measurement*, *63*(5), 825-839.

Gardner, S. K. (2013). Paradigmatic differences, power, and status: A qualitative investigation of faculty in one interdisciplinary research collaboration on sustainability science. *Sustainability Science*, *8*(2), 241-252.

Gasman, M., Kim, J., & Nguyen, T. H. (2011). Effectively recruiting faculty of color at highly selective institutions: A school of education case study. *Journal of Diversity in Higher Education, 4*(4), 212.

Gibney, R., & Shang, J. (2007). Decision making in academia: A case of the dean selection process. *Mathematical and Computer Modelling*, *46*(7-8), 1030-1040.

Glass, C., & Minnotte, K. L. (2010). Recruiting and hiring women in STEM fields. *Journal of Diversity in Higher Education, 3*(4), 218-229.

Godechot, O. (2014). The chance of influence: A natural experiment on the role of social capital in academic hiring. MaxPo Discussion Paper (Volume 14-1).

Godechot, O., Mariot, N. (2004). Les deux formes du capital social: Structure relationnelle des jurys de thèse et recrutement en science politique. *Revue Française de Sociologie, 45*(2), 243–282.

Gonzalez, C. (2001). Tips to help female academic leaders do the right thing. *Women in Higher Education, 10*, 7-8.

Gorman, E. H. (2005). Gender stereotypes, same-gender preferences, and organizational variation in the hiring of women: Evidence from law firms. *American Sociological Review, 70*, 702-728.

Grenfell, M. & James, D. (1998). *Bourdieu and education: Acts of practical theory*. Psychology Press.

Griffin, K. A. (2013). The calculus of yes and no: How one professor makes decisions about academic service. *Thought & Action, 29*, 35-43.

Griffin, K.A., Bennett, J.C., & Harris, J. (2011). Analyzing gender differences in black faculty marginalization through a sequential mixed-methods design. *New Directions for Institutional Research, 151*, 45-61.

Guarino, C. M., & Borden, V. M. (2017). Faculty service loads and gender: Are women taking care of the academic family?. *Research in Higher Education, 58*(6), 672-694.

Gumpertz, M., Durodoye, R., Griffith, E., & Wilson, A. (2017). Retention and promotion of women and underrepresented minority faculty in science and engineering at four large land grant institutions. *PloS One*, *12*(11), e0187285.

Hagedorn, L. S. (2001). Gender Differences in Faculty Productivity, Satisfaction, and Salary: What Really Separates Us?. ERIC Clearinghouse on Higher Education.

Hannum, K., Muhly, S., Shockley-Zalabak, P., & White, J. S. (2014). *Stories from the summit trail: Leadership journeys of senior women in higher education.* Denver, CO: Higher Education Resource Services (HERS). http://hersnet.org/wp-content/uploads/2014/07/StoriesfromtheSummitTrail.pdf

Hargens, L. L., & Long, J. S. (2002). Demographic inertia and women's representation among faculty in higher education. *The Journal of Higher Education*, *73*(4), 494-517.

Harley, D. A. (2008). Maids of academe: African American women faculty at predominantly white institutions. *Journal of African American Studies, 12*, 19–36.

Hart, J. (2016). Dissecting a gendered organization: Implications for career trajectories for mid-career faculty women in STEM. *The Journal of Higher Education*, *87*(5), 605-634.

Hart, J. L., & Cress, C. M. (2008). Are women faculty just "worrywarts?" Accounting for gender differences in self-reported stress. *Journal of Human Behavior in the Social Environment*, *17*(1-2), 175-193.

Häuberer J. (2011) The Founding Concepts of Social Capital - Bourdieu's Theory of Capital and Coleman's Rational-Choice Approach to Social Capital. In *Social Capital Theory*. VS Verlag für Sozialwissenschaften.

Headworth, S., & Freese, J. (2016). Credential privilege or cumulative advantage? Prestige, productivity, and placement in the academic sociology job market. *Social Forces*, *94*(3), 1257-1282.

Heilman, M. E. (2001). Description and prescription: How gender stereotypes prevent women's ascent up the organizational ladder. *Journal of Social Issues*, *57*(4), 657-674.

Heilman, M.E., Wallen, A.S., Fuchs, D., & Tamkins, M.M. (2004). Penalties for success: Reaction to women who succeed in male gender-typed tasks. *Journal of Applied Psychology, 89*(3), 416–427.

Henrich, J., & Gil-White, F. J. (2001). The evolution of prestige: Freely conferred deference as a mechanism for enhancing the benefits of cultural transmission. *Evolution and Human Behavior*, *22*(3), 165-196.

Hirsch, J. E. (2005) An index to quantify an individual's scientific research output. *Proc. Natl Acad. Sci. USA, 102*, 16569–16572.

Huber, C. & O'Rourke, S. (2017). How to accelerate gender diversity on boards. McKinsey Quarterly. https://www.mckinsey.com/featured-insights/leadership/how-to-accelerate-gender-diversity-on-boards

Hurtado, S., Eagan, M. K., Pryor, J. H., Whang, H., & Tran, S. (2012). *Undergraduate teaching faculty: The 2010–2011 HERI Faculty Survey*. Los Angeles, CA: Higher Education Research Institute, UCLA.

Ibarra, H. (1993). Personal networks of women and minorities in management: A conceptual framework. *Academy of Management Review, 18*, 56–87.

Ibarra, H. (1997). Paving an alternative route: Gender differences in networks strategies for career development. *Social Psychology Quarterly, 60*, 91-102.

Ibarra, H., & Deshpande, P. (2004). Networks and identities: Reciprocal influences on career processes and outcomes. Working Paper Series – INSEAD (2004 /85 /OB). http://www.library.nyenrode.nl/INSEAD/2004 /2004 -085 .pdf

Ibarra, H., Kilduff, M., & Tsai, W. (2005). Zooming in and out: Connecting individuals and collectivities at the frontiers of organizational network research. *Organization Science, 16(*4), 359–371.

Jacobs, J., & Winslow, S. (2004). Overworked faculty: Job stresses and family demands. *Annals of the American Academy of Political and Social Science, 596*, 104–129.

Jimeno-Ingrum, D., Berdahl, J. L., & Lucero-Wagoner, B. (2009). Stereotypes of Latinos and Whites: Do they guide evaluations in diverse work groups?. *Cultural Diversity and Ethnic Minority Psychology*, *15*(2), 158-164.

Johnson, H. L. (2017). *Pipelines, Pathways, and Institutional Leadership: An Update on the Status of Women in Higher Education*. Washington, DC: American Council on Education.

Johnsrud, L. K., & Des Jarlais, C. D. (1994). Barriers to tenure for women and minorities. *The Review of Higher Education, 17*(4), 335-353.

June, A.W., & Bauman, D. (2019, January). The Provost's Path: How More Than 200 Scholars Reached the Top Academic Job on Campus, and Where They Went Next. *The Chronicle of Higher Education*. https://www.chronicle.com/interactives/provost

Kachchaf, R., Ko, L., Hodari, A., & Ong, M. (2015). Career–life balance for women of color: Experiences in science and engineering academia. *Journal of Diversity in Higher Education*, *8*(3), 175-191.

Kanter, R. M. (1977). *Men and women of the corporation.* Basic Books.

Keim, M.C., & Murray, J.P. (2008). Chief academic officers' demographics and educational backgrounds. *Community College Review*, *36*(2), 116-132.

Keith, B., & Babchuk, N. (1998). The quest for institutional recognition: A longitudinal analysis of scholarly productivity and academic prestige among sociology departments. *Social Forces*, *76*(4), 1495-1533.

Kelly, M.L. (2011). *Next in Line: Women Chief Academic Officers, Their Experiences and Career Aspirations.* [Unpublished doctoral dissertation]. University of Pennsylvania.

Kemelgor, C. and Etzkowitz, H. (2001), Overcoming isolation: women's dilemmas in American academic service. *Minerva, 39,* 153–74.

Kennedy, D. (1997). *Academic duty.* Harvard University Press.

Kilduff, M., & Tsai, W. (2003). *Social networks and organizations*. Sage Publications Ltd.

Kim, J. Y., Fitzsimons, G. M., & Kay, A. C. (2018). Lean in messages increase attributions of women's responsibility for gender inequality. *Journal of Personality and Social Psychology*, *115*(6), 974-1001.

King, J., & Gomez, G. (2008). *On the pathway to the presidency: Characteristics of higher education's senior leadership.* Washington DC: American Council on Education.

Knobloch-Westerwick, S., Glynn, C. J., & Huge, M. (2013). The Matilda effect in science communication: an experiment on gender bias in publication quality perceptions and collaboration interest. *Science Communication*, *35*(5), 603-625.

Konrad, A. M., & Pfeffer, J. (1991). Understanding the hiring of women and minorities in educational institutions. *Sociology of Education, 64*(3), 141-157.

Kuh, B. G. D., Douglas, K. B., Lund, J. P., & Gyurmek, J. R. (1994). Student learning. *ASHE-ERIC Higher Education Report*, (8).

Kuh, G. D., & Pascarella, E. T. (2004). What does institutional selectivity tell us about educational quality?. *Change: The Magazine of Higher Learning*, *36*(5), 52-59.

Kuh, G. D., Laird, T. F. N., & Umbach, P. D. (2004). Aligning Faculty Activities & Student Behavior: Realizing the Promise of Greater Expectations. *Liberal Education*, *90*(4), 24-31.

Kulis, S. (1997). Gender segregation among college and university employees. *Sociology of Education*, *70*(2),151-173.

Kulis, S., Sicotte, D., & Collins, S. (2002). More than a pipeline problem: Labor supply constraints and gender stratification across academic science disciplines. *Research in Higher Education*, *43*(6), 657-691.

Laden, B. V., & Hagedorn, L. S. (2000). Job satisfaction among faculty of color in academe: Individual survivors or institutional transformers?. *New Directions for Institutional Research*, *2000*(105), 57-66.

Lamont, M., & Lareau, A. (1988). Cultural capital: Allusions, gaps and glissandos in recent theoretical developments. *Sociological Theory*, 153-168.

Langan, A. (2019). *Female Managers and Gender Disparities: The Case of Academic Department Chairs*. Working paper. https://scholar.princeton.edu/alangan/publications/female-managers-and-gender-disparities-case-academic-department-chairs.

Latham, S., & Braun, M. (2020, June). *It's now or never.* The Chronicle of Higher Education. https://www.insidehighered.com/views/2020/06/01/survive-post-pandemic-world-colleges-must-rethink-their-value-proposition-now

Latimer, M., Jackson, K., Dilks, L., Nolan, J., & Tower, L. (2014). Organizational change and gender equity in academia: Using dialogical change to promote positive departmental climates. *Gender Transformation in the Academy (Advances in Gender Research, Vol. 19)*. Emerald Group Publishing Limited.

Latz, A. O., & Rediger, J. N. (2015). Navigating the water: community college faculty and work-life balance. *The Journal of Faculty Development*, *29*(1), 13-24.

Laursen, S. L., Austin, A. E., Soto, M., & Martinez, D. (2015). ADVANCing the agenda for gender equity. *Change: The Magazine of Higher Learning*, *47*(4), 16-24.

Leatherwood, L. & Williams, M. (2008). Gender and career paths. J*ournal of Women in Educational Leadership, 6(*4), 261-273.

Leggon, C. (2001). African American and Hispanic Women in Science and Engineering, *Making Strides* 3(3), 7.

Lennartz, C. & O'Meara, K. (2018). Navigating a Foggy Climate: Women Associate Professors' Sense of Agency and Work Environment Experiences. In V. Baker (Ed.). *Success After Tenure: Supporting Mid-Career Faculty*, (pp. 285-310). Stylus.

Lerback, J., & Hanson, B. (2017). Journals invite too few women to referee. *Nature*, *541*(7638), 455-457.

Leslie, S. J., Cimpian, A., Meyer, M., & Freeland, E. (2015). Expectations of brilliance underlie gender distributions across academic disciplines. *Science*, *347*(6219), 262-265.

Lester, J., & Sallee, M. W. (2017). Troubling gender norms and the ideal worker in academic life. In *Critical approaches to women and gender in higher education* (pp. 115-138). Palgrave Macmillan.

Li, D., & Koedel, C. (2017). Representation and salary gaps by race-ethnicity and gender at selective public universities. *Educational Researcher*, *46*(7), 343-354.

Liang, X., & Bilimoria, D. (2007). The representation and experience of women faculty in STEM fields. In R. Burke & M. Mattis (Eds.), *Women and minorities in science, technology, engineering, and mathematics: Upping the numbers*, (pp. 317-332). Edward Elgar Publishing, Inc.

Liebert, R. J. (1976). Productivity, Favor and Grants Among Scholars. *The American Journal of Sociology, 82*(3), 664–673.

Liebert, R. J. (1977). Research-Grant Getting and Productivity Among Scholars: Recent National Patterns of Competition and Favors. *The Journal of Higher Education, 48,* 164–192.

Lin, N. (1999). Building a network theory of social capital. *Connections, 22*(1), 28-51.

Link, A. N., Swann, C. A., & Bozeman, B. (2008). A time allocation study of university faculty. *Economics of Education Review*, *27*(4), 363–374.

Lone, F. A., & Hussain, M. (2017). Gender variations in research productivity: insights from scholarly research. *Library Philosophy and Practice*, 1-12.

Long, J. S., Allison, P. D., & McGinnis, R. (1993). Rank advancement in academic careers: Sex differences and the effects of productivity. *American Sociological Review*, 703-722.

Lutz-Ritzheimer, M. K. (2005). *Defining Successful Performance in the Role of the Community College Chief Academic Officer: A Qualitative Study of CAOs Within the Oregon Community College System* [Unpublished doctoral dissertation]. Oregon State University.

MacMynowski, D. P. (2007). Pausing at the brink of interdisciplinarity: power and knowledge at the meeting of social and biophysical science. *Ecology and Society*, *12*(1).

Madera, J. M., Hebl, M. R., Dial, H., Martin, R., & Valian, V. (2018). Raising doubt in letters of recommendation for academia: Gender differences and their impact. *Journal of Business and Psychology*, 34, 287-303.

Madera, J.A. & Hebl & Martin, R.C.(2009). Gender and letters of recommendation for academia: Agentic and communal differences. *Journal of Applied Psychology, 94*(6), 1591-1599.

Magua, W., Zhu, X., Bhattacharya, A., Filut, A., Potvien, A., Leatherberry, R., Lee, Y., Dastagiri-Malikireddy, M.J., Carnes, M., & Kaatz, A. (2017). Are female applicants disadvantaged in National Institutes of Health peer review? Combining algorithmic text mining and qualitative methods to detect evaluative differences in R01 reviewers' critiques. *Journal of Women's Health*, *26*(5), 560-570.

Maranto, C. L., & Griffin, A. E. (2011). The antecedents of a 'chilly climate' for women faculty in higher education. *Human Relations*, *64*(2), 139-159.

Marschke, R., Laursen, S., Nielsen, J. M., & Dunn-Rankin, P. (2007). Demographic inertia revisited: An immodest proposal to achieve equitable gender representation among faculty in higher education. *The Journal of Higher Education, 78,* 1–26.

Martin, A. & O'Meara, K. (2017). Conditions Enabling Women's Leadership in Community Colleges. In Eddy, P., & Ward, K. (Eds.), *Critical Approaches to Women and Gender in Higher Education* (pp. 61-86). Palgrave MacMillan US.

Mason, M. A., & Goulden, M. (2004). Marriage and baby blues: Redefining gender equity in the academy. *The Annals of the American Academy of Political and Social Science*, *596*(1), 86-103.

Mason, M. A., Wolfinger, N. H., & Goulden, M. (2013). *Do babies matter? Gender and family in the ivory tower.* Rutgers University Press.

Matthew, P. A. (Ed.). (2016). *Written/unwritten: Diversity and the hidden truths of tenure*. UNC Press Books.

McDade, S. A., Richman, R. C., Jackson, G. B., & Morahan, P. S. (2004). Effects of participation in the Executive Leadership in Academic Medicine (ELAM) program on women faculty's perceived leadership capabilities. *Academic Medicine*, *79*(4), 302-309.

McDonald, S. (2011). What's in the "old boys" network? Accessing social capital in gendered and racialized networks. *Social Networks*, *33*(4), 317-330.

McKenney, C. B., & Cejda, B. D. (2000). Profiling chief academic officers in public community colleges. *Community College Journal of Research and Practice, 24,* 745- 758.

Mech, T. (1997). The managerial roles of chief academic officers. *The Journal of Higher Education*, *68*(3), 282-298.

Melguizo, T., & Strober, M. H. (2007). Faculty salaries and the maximization of prestige. *Research in Higher Education*, *48*(6), 633-668.

Mendoza, P., Kuntz, A. M., & Berger, J. B. (2012). Bourdieu and academic capitalism: Faculty "habitus" in materials science and engineering. *The Journal of Higher Education*, *83*(4), 558-581.

Merriam, S.B. (1998). *Case study research in education: A qualitative approach.* Jossey-Bass.

Metz, I., & Tharenou, P. (2001). Women's career advancement: The relative contribution of human and social capital. *Group & Organization Management, 26*(3), 312-342.

Milem, J. F. (2001). Increasing Diversity Benefits: How Campus Climate and Teaching Methods Affect Student Outcomes. In G. Orfield (Ed.), *Diversity Challenged: Evidence on the Impact of Affirmative Action* (pp. 233-249). Harvard Education Publishing Group.

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

Misra, J., Lundquist, J. H., & Templer, A. (2012). Gender, worktime, and care responsibilities among faculty. *Sociological Forum, 27*(2), 300–323.

Misra, J., Lundquist, J. H., Holmes, E., & Agiomavritis, S. (2011). The ivory ceiling of service work. *Academe*, *97*(1), 22-26.

Mitchell, S. M., & Hesli, V. L. (2013). Women don't ask? Women don't say no? Bargaining and service in the political science profession. *PS: Political Science & Politics*, *46*(2), 355–369.

Modern Language Association. (2009). *Standing still: The associate professor survey*. (Report on the Committee on the Status of Women in the Profession). Modern Language Association.

Moed, H. F. (2005) *Citation Analysis in Research Evaluation.* Springer.

Mohr, T.S. (2014, August). Why Women Don't Apply for Jobs Unless They're 100% Qualified. *Harvard Business Review*. https://hbr.org/2014/08/why-women-dont-apply-for-jobs-unless-theyre-100-qualified

Monroe, K. R., & Chiu, W. F. (2010). Gender equality in the academy: The pipeline problem. *PS: Political Science & Politics*, *43*(2), 303-308.

Moody, J. (2004). Supporting women and minority faculty. *Academe*, *90*(1), 47.

Moore, K. M., Salimbene, A. M., Marlier, J. D., & Bragg, S. M. (1983). The structure of presidents' and deans' careers. *The Journal of Higher Education*, *54*(5), 500-515.

Morrison, E., Rudd, E., Picciano, J., & Nerad, M. (2011). Are you satisfied? PhD education and faculty taste for prestige: Limits of the prestige value system. *Research in Higher Education*, *52*(1), 24-46.

Moss-Racusin, C. A., Dovidio, J. F., Brescoll, V. L., Graham, M. J., & Handelsman, J. (2012). Science faculty's subtle gender biases favor male students. *Proceedings of the National Academy of Sciences*, *109*(41), 16474-16479.

Naff, K. C. (1994). Through the glass ceiling: Prospects for the advancement of women in the federal civil service. *Public Administration Review, 54,* 507-514.

National Center for Education Statistics, Integrated Postsecondary Education Data System (2017). *Full-time faculty in degree-granting postsecondary institutions, by race/ethnicity, sex, and*

academic rank: Fall 2013, fall 2015, and fall 2016. U.S. Department of Education. https://nces.ed.gov/programs/digest/d17/tables/dt17_315.20.asp

National Research Council. (2010). *Gender Differences at Critical Transitions in the Careers of Science, Engineering, and Mathematics Faculty*. Washington, DC: The National Academies Press.

National Science Foundation (2018). *2016 Doctorate recipients from U.U. universities*. National Center for Science and Engineering Statistics Directorate for Social, Behavioral and Economic Sciences. https://www.nsf.gov/statistics/2018/nsf18304/static/report/nsf18304-report.pdf

National Science Foundation. (2017). Federal Funds for R&D survey data series. National Science Foundation. https://www.aaas.org/programs/r-d-budget-and-policy/research-science-and-engineering-discipline.

National Science Foundation. (2014). *Women, minorities, and persons with disabilities in science and engineering.* National Center for Science and Engineering Statistics, National Science Foundation. https://www.nsf.gov/statistics/2016/nsb20161/#/report/chapter-5/doctoral-scientists-and-engineers-in-academia/federal-support-of-doctoral-researchers-in-academia.

National Science Foundation. (2001, October). *NSF Announces Institutional Transformation Awards Under "ADVANCE"* [Press release]. https://www.nsf.gov/od/lpa/news/press/01/pr0179.htm

Nelson, D. J., & Rogers, D. C. (2003). *A national analysis of diversity in science and engineering faculties at research universities*. Washington DC: National Organization for Women.

Nevarez, C., & Borunda, R. (2004). Faculty of color: Contesting the last frontier. Sacramento, CA: Serna Center. http://www.csus.edu/sernacenter/assets/scholar reports/nevarez_borunda.pdf

Niehaus, E., & O'Meara, K. (2015). Invisible but essential: The role of professional networks in promoting faculty agency in career advancement. *Innovative Higher Education*, *40*(2), 159-171.

Niemeier, D. A., & González, C. (2004). Breaking into the guildmasters' club: What we know about women science and engineering department chairs at AAU universities. *NWSA Journal*, 157-171.

Noland, M., Moran, T., Kotzscwar, B. (2016, February). Is Gender Diversity Profitable? Evidence from a global survey. Peterson Institute for International Economics. https://piie.com/publications/wp/wp16-3.pdf?elqTrackId=5b7f299232cb4177be66853be19067d0&elq=63a914b9c1bc4ff2b86f7a9304cfdf43&elqaid=14083&elqat=1&elqCampaignId=5891

Olaniyan, D. A., & Okemakinde, T. (2008). Human capital theory: Implications for educational development. *Pakistan Journal of Social Sciences, 5*(5), 479-483.

O'Laughlin, E. M., & Bischoff, L. G. (2005). Balancing parenthood and academia: Work/family stress as influenced by gender and tenure status. *Journal of Family Issues, 26*(1), 79–106

O'Meara, K. (2011). Inside the Panopticon: Studying academic reward systems. In J.C. Smart & M.B. Paulsen (Eds.), *Higher Education: Handbook of Theory and Research* (pp. 161–220). Springer.

O'Meara, K. (2016). Whose Problem is It? Gender Differences in Faculty Thinking about Campus Service. *Teachers College Record, 118*(080306), 1-38.

O'Meara, K. & Campbell, C.M. (2011). Faculty sense of agency in decisions about work and family. *Review of Higher Education, 34*(3), 447-476.

O'Meara, K., Culpepper, D., & Templeton, L. L. (2020). Nudging Toward Diversity: Applying Behavioral Design to Faculty Hiring. *Review of Educational Research,* 0034654320914742.

O'Meara, K., Jaeger, A., Misra, J. Lennartz, C. & Kuvaeva, A. (2018). Undoing disparities in faculty workloads: A randomized trial experiment. *PLOS ONE, 13*(12).

O'Meara, K., Kuvaeva, A., & Nyunt, G. (2017). Constrained Choices: A View of Campus Service Inequality from Annual Faculty Reports. *Journal of Higher Education, 88*(5), 672-700.

O'Meara, K., Lennartz, C., Kuvaeva, A., Jaeger, A., Misra, J. (2019). Department Conditions and Practices Associated with Faculty Workload Satisfaction, Perceptions of Equity, and Intent to Leave. *The Journal of Higher Education, 90*(5), 744-772.

Oprisko, R. (2013). Honor, prestige, and the academy: A portrait of political science tenured and tenure-track faculty in Ph. D.-granting institutions (2012-2013). Paper presented at the American Political Science Association 2013 Annual Meeting, Washington D.C.

Oprisko, R., Dobbs, K., & DiGrazia, J. (2013). Pushing up ivies: Institutional prestige and the academic caste system. *Georgetown Public Policy Review*.

Padilla, R. V., & Chávez, R. C. (Eds.). (1995). *Leaning ivory tower: Latino professors in American universities*. SUNY Press.

Park, S. M. (1996). Research, teaching, service: Why shouldn't women's work count? *Journal of Higher Education, 67*(1), 46-84.

Paulsen, M. B. (2001). The economics of human capital and investment in higher education. In M. B. Paulsen & J. C. Smart (Eds.), *The finance of higher education: Theory, research, policy, and practice* (pp. 55-94). New York: Agathon Press.

Paulsen, M. B., & St. John, E. P. (1997). The financial nexus between college choice and persistence. In R. A. Voorhees (Ed.), *Researching student aid: Creating an action agenda* (New Directions for Institutional Research No. 95, pp. 65- 82). San Francisco: Jossey-Bass.

Perna, L.W. (2001). Sex and race differences in faculty tenure and promotion. *Research in Higher Education, 42*(5), 541-567.

Perna, L. W. (2003). Studying faculty salary equity: A review of theoretical and methodological approaches. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research (volume xviii)* (pp. 323-388). Kluwer Academic Publishers.

Perna, L. W. (2005). Sex differences in faculty tenure and promotion: The contribution of family ties. *Research in Higher Education*, *46*(3), 277-307.

Phelan, J. E., Moss-Racusin, C. A., & Rudman, L. A. (2008). Competent yet out in the cold: Shifting criteria for hiring reflect backlash toward agentic women. *Psychology of Women Quarterly, 32*(4), 406-413.

Piercy, F., Giddings, V., Allen, K., Dixon, B., Meszaros, P., & Joest, K. (2005). Improving campus climate to support faculty diversity and retention: A pilot program for new faculty. *Innovative Higher Education*, *30*(1), 53-66.

Pittman, C. T. (2010). Race and gender oppression in the classroom: The experiences of women faculty of color with white male students. *Teaching Sociology*, *38*(3), 183-196.

Pitts, D. G. (2017). *The Academic Search: Unconscious Bias and Its Impact on the Recruitment and Evaluation of Faculty Candidates*. [Unpublished doctoral dissertation]. Oakland University.

Pololi, L., & Knight, S. (2005). Mentoring faculty in academic medicine. *Journal of General Internal Medicine*, *20*(9), 866-870.

Ponjuan, L., Conley, V. M., & Trower, C. (2011). Career stage differences in pre-tenure track faculty perceptions of professional and personal relationships with colleagues. *The Journal of Higher Education, 82*(3), 319–346.

Porter, S. R., Toutkoushian, R. K., & Moore III, J. V. (2008). Pay inequities for recently hired faculty, 1988-2004. *The Review of Higher Education*, *31*(4), 465-487.

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

Powell, G. N., Butterfield, D. A., & Parent, J. D. (2002). Gender and managerial stereotypes: have the times changed?. *Journal of Management*, *28*(2), 177-193.

Quadlin, N. (2018). The mark of a woman's record: Gender and academic performance in hiring. *American Sociological Review*, *83*(2), 331-360.

Raatikainen, P. (2002). Contributions of multiculturalism to the competitive advantage of an organization. *Singapore Management Review, 24*, 1–85.

Rapoport, R., Bailyn, L., Fletcher, J.K., & Pruitte, B. (2002). *Beyond Work–family Balance: Advancing Gender Equity and Workplace Performance.* Jossey Bass.

Ravitch, S., and Carl, N. (2016). *Qualitative research: Bridging the conceptual, theoretical, and methodological.* Sage.

Reddick, R. J., Rochlen, A. B., Grasso, J. R., Reilly, E. D., & Spikes, D. D. (2012). Academic fathers pursuing tenure: A qualitative study of work-family conflict, coping strategies, and departmental culture. *Psychology of Men & Masculinity*, *13*(1), 1-15.

Rhoades, G., Kiyama, J. M., McCormick, R., & Quiroz, M. (2008). Local cosmopolitans and cosmopolitan locals: New models of professionals in the academy. *Review of Higher Education, 31*(2), 209–235.

Richart, V. M. (2002). The institutional vision, virtual centre for community college transformation. *Journal of Further and Higher Education*, *28*(1), 95-106.

Ridgeway, C.L. (2001). Gender, status, and leadership. *Journal of Social Issues, 57*(4), 637-655.

Rincón, B. E., & George-Jackson, C. E. (2016). Examining department climate for women in engineering: The role of STEM interventions. *Journal of College Student Development*, *57*(6), 742-747.

Rosenbaum, J. E. (1986). Institutional career structures and the social construction of ability. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 139-171). Greenwood Press.

Rosinger, K. O., Taylor, B. J., Coco, L., & Slaughter, S. (2016). Organizational segmentation and the prestige economy: Deprofessionalization in high-and low-resource departments. *The Journal of Higher Education*, *87*(1), 27-54.

Ross, M., & Green, M. F. (1990). The rules of the game: The unwritten code of career mobility. In K.M. Moore & S.B. Twombly (Eds.), *New Directions for Higher Education, 72* (pp. 67-77). Jossey-Bass Inc., Publishers.

Rosser, V. J. (2004). Faculty members' intentions to leave: A national study on their worklife and satisfaction. *Research in Higher Education*, *45*(3), 285-309.

Rosovsky, H. (1990). *The university: An owner's manual.* Norton & Company.

Rudman, L. A., & Glick, P. (2001). Prescriptive gender stereotypes and backlash toward agentic women. *Journal of Social Issues*, *57*(4), 743-762.

Rudman, L. A., & Phelan, J. E. (2008). Backlash effects for disconfirming gender stereotypes in organizations. *Research in Organizational Behavior*, *28*, 61-79.

Sallee, M. W. (2012). The ideal worker or the ideal father: Organizational structures and culture in the gendered university. *Research in Higher Education*, *53*(7), 782-802.

Sallee, M. W. (2013). Gender norms and institutional culture: The family-friendly versus the father-friendly university. *Journal of Higher Education, 84*(3), 363-396.

Sax, L. J., Hagedorn, L., Arredondo, M., & Dicrisi, F. A. (2002). Faculty research productivity: Exploring the role of gender and family-related factors. *Research in Higher Education, 43*, 423–446.

Schein, E. H. (2001). *Organizational culture and leadership*. Jossey-Bass Incorporated.

Schmader, T., Whitehead, J., & Wysocki, V. H. (2007). A linguistic comparison of letters of recommendation for male and female chemistry and biochemistry job applicants. *Sex Roles*, *57*(7-8), 509-514.

Seibert, S. E., Kraimer, M. L., & Liden, R. C. (2001). A social capital theory of career success. *Academy of Management Journal, 44,* 219–237.

Settles, I. H., Buchanan, N. T., & Dotson, K. (2019). Scrutinized but not recognized: (In)visibility and hypervisibility experiences of faculty of color. *Journal of Vocational Behavior*, *113*, 62-74.

Shaw, A. K., & Stanton, D. E. (2012). Leaks in the pipeline: Separating demographic inertia from ongoing gender differences in academia. *Proceedings of the Royal Society of London B: Biological Sciences, 279*(1743), 3736-3741.

Sheltzer, J. M., & Smith, J. C. (2014). Elite male faculty in the life sciences employ fewer women. *Proceedings of the National Academy of Sciences*, *111*(28), 10107-10112.

Sheridan, J., Savoy, J. N., Kaatz, A., Lee, Y. G., Filut, A., & Carnes, M. (2017). Write more articles, get more grants: The impact of department climate on faculty research productivity. *Journal of Women's Health*, *26*(5), 587-596.

Shin, J., & Cummings, W. (2010). Multilevel analysis of academic publishing across disciplines: Research preference, collaboration, and time on research. *Scientometrics*, *85*(2), 581-594.

Smart, J. C. (1991). Gender equity in academic rank and salary. *The Review of Higher Education*, *14*(4), 511-525.

Social Sciences Feminist Network Research Interest Group. (2017). The burden of invisible work in academia: Social inequalities and time use in five university departments. *Humboldt Journal of Social Relations*, *39*, 228-245.

Stage, F., & Hubbard, S. (2008). Teaching Latino, African American and Native American undergraduates: Faculty attitudes conditions, and practices. In *Understanding Minority Serving Institutions: New Interdisciplinary Perspectives*. SUNY Press.

Steffen-Fluhr, N. (2006). *Advancing women faculty through collaborative research networks*. [Proceedings of the 2006 WEPAN Conference]. Women in Engineering ProActive Network, Pittsburgh, PA.

Steinmetz, G. (2006). Bourdieu's disavowal of Lacan: psychoanalytic theory and the concepts of "habitus" and "symbolic capital". *Constellations*, *13*(4), 445-464.

Stephan, P. (2012). *How economics shapes science*. Harvard University Press.

Stewart, A. J., & Valian, V. (2018). *An inclusive academy: Achieving diversity and excellence*. MIT Press.

Stoloff, J. A., Glanville, J. L., & Bienenstock, E. J. (1999). Women's participation in the labor force: the role of social networks. *Social Networks*, *21*(1), 91-108.

Storage, D., Horne, Z., Cimpian, A., & Leslie, S. J. (2016). The frequency of "brilliant" and "genius" in teaching evaluations predicts the representation of women and African Americans across fields. *PloS one*, *11*(3), e0150194.

Strand, M., & Bulik, C. M. (2018). Trends in female authorship in research papers on eating disorders: 20-year bibliometric study. *BJPsych Open*, *4*(2), 39-46.

Strober, M. H. (1990). Human capital theory: Implications for HR managers. *Industrial Relations: A Journal of Economy and Society*, *29*(2), 214-239.

Sturm, S. (2006). The architecture of inclusion: Advancing workplace equity in higher education. *Harv. JL & Gender*, *29*, 247.

Tharenou, P. (1997). Explanations of managerial career advancement. *Australian Psychologist*, *32*(1), 19-28.

Tharenou, P. (2001). Going up? Do traits and informal social processes predict advancing in management?. *Academy of management Journal*, *44*(5), 1005-1017.

Tharenou, P., Latimer, S., & Conroy, D. (1994). How do you make it to the top? *Academy of Management Journal, 37*(4), 899-931.

Thompson, B. (1988). Misuse of chi-square contingency-table test statistics. *Educational & Psychological Research, 8*(1), 39–49.

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

Toren, N., & Kraus, V. (1987). The effects of minority size on women's position in academia. *Social Forces*, *65*(4), 1090-1100.

Tötösy de Zepetnek, S., & Jia, J. (2014). Electronic journals, prestige, and the economics of academic journal publishing. *Comparative Literature and Culture*, *16*(1), 12.

Toutkoushian, R. K. (1999). The status of academic women in the 1990s no longer outsiders, but not yet equals. *The Quarterly Review of Economics and Finance*, *39*(5), 679-698.

Toutkoushian, R. K. (Ed.). (2002). *Conducting salary equity studies: Alternative approaches to research (Vol. 115)*. Jossey Bass.

Toutkoushian, R. K. (2003). What can labor economics tell us about the earnings and employment prospects for faculty. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research (volume xviii)* (pp. 263-322). Kluwer Academic Publishers.

Toutkoushian, R. K., & Conley, V. M. (2005). Progress for women in academe, yet inequities persist: Evidence from NSOPF: 99. *Research in Higher Education*, *46*(1), 1-28.

Townsend, B. K., & Twombly, S. B. (2007). Accidental equity: The status of women in the community college. *Equity & Excellence in Education, 40*(3), 208-217.

Trix, F., & Psenka, C. (2003). Exploring the color of glass: Letters of recommendation for female and male medical faculty. *Discourse & Society*, *14*(2), 191-220.

Trower, C. A., & Chait, R. (2002). Faculty diversity. *Harvard Magazine, 104*(4), 33-38.

Turner, C. S. V. (2002). Women of color in academe: Living with multiple marginality. *The Journal of Higher Education, 73(*1), 74–93.

Turner, C. S. V., & González, J. C. (2011). Faculty women of color: The critical nexus of race and gender. *Journal of Diversity in Higher Education*, *4*(4), 199-211.

Turner, C. S. V., González, J. C., & Wood, J. L. (2008). Faculty of color in academe: What 20 years of literature tells us. *Journal of Diversity in Higher Education*, *1*(3), 139-168.

Turner, C. S. V., Myers Jr, S. L., & Creswell, J. W. (1999). Exploring underrepresentation: The case of faculty of color in the Midwest. *The Journal of Higher Education*, *70*(1), 27-59.

Turner, C. S. V., & Myers, Jr, S. L. (1999*). Faculty of Color in Academe: Bittersweet Success*. Allyn & Bacon.

U.S. Department of Education. (2016). *Digest of Education Statistics 2016, Table 315.20*. Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Umbach, P. D. (2008, March). *Gender equity in college faculty pay: A cross-classified random effects model examining the impact of human capital, academic disciplines, and institutions*. Annual Meeting of the American Educational Research Association, New York, NY.

Umbach, P. D. (2007). Gender equity in the academic labor market: An analysis of academic disciplines. *Research in Higher Education*, *48*(2), 169-192.

Umbach, P. D. (2006). The contribution of faculty of color to undergraduate education. *Research in Higher Education*, *47*(3), 317-345.

Valian, V. (2005). Beyond gender schemas: Improving the advancement of women in academia. *Hypatia, 20*(3), 198-213.

Valian, V. (2006). Beyond gender schemas: Improving the advancement of women in academia. In J. M. Bystydzienski, & S. R. Bird (Eds.), *Removing Barriers: Women in Academic Science, Technology, Engineering, and Mathematics* (pp. 320-332). Indiana University Press.

Van Anders, S. M. (2004). Why the academic pipeline leaks: Fewer men than women perceive barriers to becoming professors. *Sex Roles*, *51*(9-10), 511-521.

Van den Besselaar, P., & Sandström, U. (2017). Vicious circles of gender bias, lower positions, and lower performance: Gender differences in scholarly productivity and impact. *PloS One*, *12*(8), e0183301.

Vesterlund, L. (2015). Breaking the glass ceiling with "no": Gender differences in accepting and receiving requests for non-promotable tasks (Working Paper 5663). Department of Economics, University of Pittsburgh.

Walton, G. M., Logel, C., Peach, J. M., Spencer, S. J., & Zanna, M. P. (2015). Two brief interventions to mitigate a "chilly climate" transform women's experience, relationships, and achievement in engineering. *Journal of Educational Psychology*, *107*(2), 468-485.

Ward, K., & Wolf-Wendel, L. (2012). *Academic motherhood: How faculty manage work and family*. Rutgers University Press.

Ward, K., & Wolf-Wendel, L. (2004). Academic motherhood: Managing complex roles in research universities. *The Review of Higher Education, 27,* 233–257.

Watson, E., K. Kumar & L. Michaelsen (1993). Cultural diversity's impact on interaction process and performance: comparing homogeneous and diverse task groups. *Academy of Management Journal, 36*, 590–603.

Watts, J., & Robertson, N. (2011). Burnout in university teaching staff: A systematic literature review. *Educational Research*, *53*(1), 33-50.

Weisshaar, K. (2017). Publish and perish? An assessment of gender gaps in promotion to tenure in academia. *Social Forces*, *96*(2), 529-560.

West, M. S., & Curtis, J. W. (2006). *AAUP faculty gender equity indicators 2006* (p. 85). Washington, DC: American Association of University Professors.

Wiggins, A. (2007). Exploring peer prestige in academic hiring networks. [Unpublished master's thesis]. University of Michigan, Ann Arbor.

Williams, J. (2000). Unbending gender: *Why family and work conflict and what to do about it.* Oxford University Press.

Williams, J. C., & Dempsey, R. (2014). *What works for women at work: Four patterns working women need to know*. New York University Press.

Williams, J. C., Blair-Loy, M., & Berdahl, J. L. (2013). Cultural schemas, social class, and the flexibility stigma. *Journal of Social Issues*, *69*(2), 209-234.

Winslow, S. (2010). Gender inequality and time allocations among academic faculty. *Gender & Society, 24,* 769–793.

Witteman, H. O., Hendricks, M., Straus, S., & Tannenbaum, C. (2019). Are gender gaps due to evaluations of the applicant or the science? A natural experiment at a national funding agency. *The Lancet*, *393*(10171), 531-540.

Wolfinger, N. H., Mason, M. A., & Goulden, M. (2008). Problems in the pipeline: Gender, marriage, and fertility in the ivory tower. *The Journal of Higher Education*, *79*(4), 388-405.

Wolf-Wendel, L., & Ward, K. (2015). Academic mothers: Exploring disciplinary perspectives. *Innovative Higher Education*, *40*(1), 19-35.

Wolf-Wendel, L., & Ward, K. (2006). Faculty work and family life: Policy perspectives from different institutional types. In S. J. Bracken, J. K. Allen, & Dean, D. R. (Eds.), *The balancing act: Gendered perspectives in faculty roles and work lives* (pp. 51-72). Stylus.

Wollebaek, D., & Selle, P. (2002). Does participation in voluntary associations contribute to social capital? The impact of intensity, scope, and type. *Nonprofit and Voluntary Sector Quarterly*, *31*(1), 32-61.

Wolverton, M., Gmelch, W. H., Montez, J., & Nies, C. T. (2001). *The Changing Nature of the Academic Deanship.* ASHE-ERIC Higher Education Report, Volume 28, Number 1. Jossey-Bass Higher and Adult Education Series. Jossey-Bass Publishers, Inc.

Wright, C. B., & Vanderford, N. L. (2017). What faculty hiring committees want. *Nature Biotechnology*, *35*(9), 885-887.

Xu, Y. J. (2008). Gender disparity in STEM disciplines: A study of faculty attrition and turnover intentions. *Research in Higher Education*, *49*, 607–624.

Xu, Y. J. (2012). The similarities and differences in the work experience of women faculty in traditional and nontraditional disciplines. *New Directions for Institutional Research*, *2012*(155), 67-83.

Yoder, J. D. (1991). Rethinking tokenism: Looking beyond numbers. *Gender & Society*, *5*(2), 178-192.

Young, P. (2004). Leadership and gender in higher education: A case study. *Journal of Further and Higher Education*, *28*(1), 95-106.

Zhou, Y. B., Lü, L., & Li, M. (2012). Quantifying the influence of scientists and their publications: Distinguishing between prestige and popularity. *New Journal of Physics*, *14*(3), 033033.