

January 2025

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Recommended Citation

Motley, Mary C.; Jensen, Jonathan A.; Weight, Erianne; and Bates, Brad (2025) "The Road Less Traveled: Analyzing the Career Paths of Women Athletic Directors Utilizing Social Network Analysis," *Journal of Issues in Intercollegiate Athletics*: Vol. 18: Iss. 1, Article 3.

DOI: 10.51221/sc.jiia.2025.18.1.3

Available at: <https://scholarcommons.sc.edu/jiia/vol18/iss1/3>

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The Road Less Traveled: Analyzing the Career Paths of Women Athletic Directors Utilizing Social Network Analysis

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The purpose of this research is to analyze the career paths of current NCAA Division I women athletic directors (ADs), towards the goal of building and identifying networks within intercollegiate athletics. By using social network analysis (SNA), this research builds out a hiring network within intercollegiate athletics by analyzing the career changes of current Division I women ADs. The objectives of this study included exploring current women AD career paths, uncovering institutions deemed most influential in the network, and comparing the career paths of women and men ADs. Findings suggest that on average, women ADs have longer career paths than men, and are alongside a much sparser network. Most women who pursued the title of AD climbed their way up through various positions in college athletics, while hubs in the network accelerated an AD's career. Institutional authorities hired women at a higher position and often at a senior executive level, prior to becoming an AD.

Keywords: intercollegiate athletics, athletic leadership, gender studies, social network analysis

<https://doi.org/10.51221/sc.jiia.2025.18.1.3>

Over a 30-year span, women holding the position of athletics director (AD) nearly doubled, from 11% to 19.5% (HigherEd Direct Database, 2018). According to data current as of April 30, 2024, there are a total of 287 women ADs across all three NCAA Divisions, including 57 in Division I (362 total institutions), 76 in Division II (out of 300), and 154 in Division III (442 total institutions; Women Leaders in Sports, 2024). Currently, a total of 287 women ADs are employed across 1,104 NCAA institutions, representing a 2.5% increase from 2023 (Women Leaders in Sports, 2024). While this data suggests the percentages have increased, less than 30% of athletic departments across all three divisions of the National Collegiate Athletic Association (NCAA) are led by women (Taylor & Wells, 2017). At the highest level of NCAA athletic competition, the 65 universities that comprise the “Power Five” conferences (now referred to as the “Power Four” due to the demise of the Pac-12 Conference), only five of those institutions (Penn State, Washington, Pittsburgh, Vanderbilt, and Virginia) had women ADs at the time of this study.

Researchers have attributed this disparity to a variety of factors, including the gravitation of women toward occupations that they perceive as consistent with their life goals (Barth et al., 2015), structural restraints within athletics (Burton et al., 2008), and a lack of masculinity traits (i.e. toughness, aggressiveness, assertiveness, etc.; Smith, 2013). However, others have found that it is the cultures adopted by the institution and the collective network one makes that will ultimately influence their advancement. According to research by Hancock and Hums (2016), a qualitative study amongst women in senior-level management positions found “participants described their networks as sources of camaraderie, commiseration, and change” (Hancock & Hums, 2016, pp. 35). By analyzing current women AD’s networks, this study aims to uncover a community that prior research has not observed and aid new professionals by informing them of the role one’s network has on career advancement.

A helpful theory that underpins the literature on career development is managerial career success theory. This area of research aims to discover success by examining at one’s profession, hierarchical level in an organization, and/or promotions. Additionally, this theory takes into account social and human capital investments as criteria for predicting career advancement. For example, Clauset et al. (2015) studied institutional prestige ranking as a form of social capital as it reflects on faculty hiring. After analyzing 19,000 faculty in three different disciplines, the research found that extreme social inequality can be found throughout faculty hiring, due to an adherence to a hierarchical structure (Clauset et. al., 2015). Additionally, the research highlighted that institutional prestige leads to better faculty placements and influential positions in the discipline (Clauset et. al., 2015).

Athletic departments are, at the core, a branch of higher education that values human and social capital. As such, athletic department employees are viewed as an integral part to the educational experience. Research by Young (1990) found 73.7% of administrators surveyed across Division I and III noted that more weight was placed on recommendations from network contacts. And as institutions begin to hire, we can assume that the leverage from personal investments of each candidate within the intercollegiate athletics network is a way to both standout and advance in the field. While there has been extensive research on the background and characteristics of athletic administrators (e.g., Fitzgerald & Sagaria, 1994; Grappendorf & Lough, 2006; Lumpkin et al., 2015; Smith, 2013; Wright et al., 2011), there is no prior research examining the career paths of women ADs that utilized social network analysis.

The purpose of this research is to analyze the career paths of current NCAA Division I women ADs in order to build and identify networks within intercollegiate athletics. By using

social network analysis (SNA), we can discover hiring patterns of institutions, identify institutional hubs that produce the most women ADs, and explore the importance of connections in the intercollegiate athletics industry. Additionally, this research will uncover patterns in career paths while also determining the average number of positions a women AD holds during her career.

Literature Review

Since 1990, women in NCAA AD positions have grown from 11% to 19.5% (HigherEd Direct Database, 2018). However, there is evidence that while the passing of Title IX increased women participation in collegiate athletics, women that have held administrative positions has decreased from 90% before Title IX to 36.2% in 2014 (Vank Kirk, 2023). Taylor and Hardin (2016) surveyed 10 women Division I ADs and found that 90% were student-athletes, 80% held a master's degree, and the other two ADs held a bachelor's degree. The career path to becoming an AD in intercollegiate athletics has often been associated with having a previous role as either an Assistant or Associate AD (Grappendorf et al., 2004). Other studies have found that gaining relevant and practical experience (Bower, 2009; Cunningham et al., 2005; Grappendorf et al., 2004, Hoffman, 2010, Hums & Sutton, 1999), cultivating mentor relationships (Bower, 2009), acquiring collegial support and networking (Inglis et al., 2000) are critical for the advancement in sport organizations.

Prior research on women sport administrator networks examined gender differences in the determinants of career success in the context of intercollegiate athletics (Cunningham & Sagas, 2004). The researchers measured career promotions, job-related personal investments (e.g., education, experience, and training), and network-related relationships in relation to career success. The study found that administrators with more human capital investments (i.e., education, experience, and training) had more promotions and men are more likely to be promoted from social capital investments (i.e., relationships and networking) than women. At the time, the study confirmed that educational backgrounds and networking had a significant impact on career success in collegiate athletics.

Later, Wright et al. (2011) utilized the human capital theory by examining the underrepresentation of women and minorities in intercollegiate athletic departments. The study focused on determining if personal human capital investments had a large effect on career success. Through comparing and contrasting 21 different variables considered to be personal investments, the study was able to determine if the lack of investments contributed to low hiring rates of women and minorities at the AD position. Using content analysis of online biographies of 348 ADs, the results suggested that men are rewarded more with employment and promotions through human social capital than women.

Grappendorf and Lough (2006) analyzed specific characteristics of Division I NCAA women ADs by examining 28 women ADs of merged and separate programs (i.e., programs with both men's and women's teams or just women's teams). The study found that out of the 28 NCAA women ADs surveyed, 79% ($n = 22$) were highly educated, having obtained a Master's degree. Out of the 24 ADs in charge of merged programs, 36.8% ($n = 7$) went on to obtain their doctoral degree. Additionally, the study noted that 100% of the women ADs (separate or merged) started as a teacher or teacher/coach combination. Grappendorf and Lough's (2006) study found that as of 2004 being an educated woman with teaching or coaching experience was the main start towards becoming an AD. While knowing the background of women ADs is important, knowing the institutional networks through which the women were educated and promoted will uncover additional hiring patterns for women ADs in collegiate athletics.

More recently, Lumpkin et al. (2015) investigated different factors that would be considered criteria for hiring and cross-referenced them with ADs at NCAA-member institutions. This criteria included the highest degree awarded, program of study, years of coaching experience, prior experience in collegiate athletics, promotions within that institution, and years in current position. The study reviewed the entire population of NCAA-member institutions (344 in Division I, 298 in Division II, and 433 in Division III) and found significant differences across divisions and between genders. One result of the study found that women ADs in Division I were more likely to have coaching experience than ADs who are men. Additionally, in Division III, women ADs had received a higher educational degree than ADs who are men. For Division I, women were more likely to be promoted from within. Understanding these results, it would be beneficial to identify the institutions that promote within and around the NCAA divisional network.

Hancock and Hums (2016) utilized interviews to uncover factors that affected the career development of 20 Assistant and Associate ADs at NCAA Division I member institutions. The study found that participants often started their careers in small departments in various NCAA division levels, allowing them to acquire numerous technical skills. In regard to positions that were sought, the participants indicated they preferred seeking jobs that aligned with their current professional interests. This is an important consideration, given the findings of Taylor and Hardin (2016) that 90% of women ADs were student-athletes and 90% were college coaches.

An in-depth study examining leadership networks throughout the NCAA was published in 2018 (Katz et al., 2018). The purpose of the study was to analyze informal affiliation networks of both senior woman administrators (SWAs) and ADs. Using a network approach guided by UCINET and Netdraw, the study was able to produce a visual examination of sociograms based on leadership network. In summary, the denser a network is represents a greater group effectiveness and access to resources for leadership roles. The results consisted of 341 ADs and 561 different organizations with a total of 1,420 edges. After analyzing the SWA network, the study found 35 isolated individuals that have no relationships with other SWA's, which was three times as many as the AD network. There was also a disparity in cohesion between the SWA and AD network, signaling a lack of mentorship and network among the SWA role. Additionally, the analysis demonstrates that the AD network facilitates connections, leading to more ADs in the future. In consequence, only one woman AD ranked in the top 25 eigenvector (popular) score, providing an insight that an SWA position may lessen a woman's chance to become an AD. The visual examination of networks will be used to uncover communities of institutions that hire from neighboring universities.

Recently, Flemington et al. (2023) investigated athlete leadership based on social cohesion and tenure, utilizing a whole SNA network design. To measure cohesion at the network level, the researchers asked 19 members of a professional women's ice hockey team to rate the leadership effectiveness for each of their teammates along with how cohesive they felt with each of their teammates. By mapping out the above, the results would be able to indicate if there is a singular teammate that exhibits greater leadership behavior within the team. The results found that the number of years on the team is "not indicative of being perceived as a leader" and that positive performance as a team is correlated to the individual athlete's leadership and cohesion which improves team effectiveness.

Due to the increasing prevalence of women athletic administrators in intercollegiate athletics, there has been an increase in interest over the past 20 years in research exploring the background, demographics, and career development of women ADs. In response, multiple sport-related studies have been published utilizing interviews and surveys to discover the characteristics of current women ADs, including a recent study in 2021 that conducted a

qualitative study on the experiences in women ADs career pathways (Heard, 2021). Heard (2021) discovered that “women must identify networks and peers to empower them throughout their career path” (Heard, 2021, pp. 11). Moving forward, SNA can be used to uncover patterns and networks in a myriad of sport categories to reflect the importance of reciprocity within administrative positions. Though SNA has been used to map the career paths of Power Five ADs (Dickman et al., 2021), it has yet been applied to D-I women ADs. In this paper, SNA will be used to investigate the career paths of D-I women ADs, providing visual insight into the interconnectedness of the intercollegiate athletics community.

Methodology

Career patterns can be studied through network analysis. Network analysis allows researchers to examine systems through established procedures to identify structures and the relationships among components (Rogers, 1981). In the webs of communities, agents as individuals or groups are connected allowing for exploration into their patterns. The network is made up of points and connected by lines to show the interconnectedness and strength of relationships between each agent (Scott, 1988). Researchers have been fascinated by the different kinds of measurements that can be drawn from SNA including centrality, which focuses on hubs of attraction, and density, which can identify ‘clusters,’ or a close-knit community (Scott, 1988).

Additionally, the relationship is applied in one direction. An undirected edge is bidirectional, meaning that the relationship between agents can go in both directions. Clauset et al. (2015) used SNA to uncover the effects of the social capital of universities on the job placement of professors by creating academic hierarchy networks. To do so, Clauset et al. (2015) used directional edges of the university from which the professor received their doctoral degree to the university that the professor earned an academic position. Once the network was completed, a visual network represented the flow of a professor’s career from one school to another. Similarly, this research will analyze the flow of the Division I women ADs by connecting her career paths to each institution. After determining a relationship, there can be a designated weight assigned with an edge. If an edge is unweighted, it is considered to have the same value. Conversely, weighted edges will have a specific value assigned to it (Newman, 2010). For example, if a network of career paths were analyzed, the weighted edges would emphasize the promotions and job levels that an agent had taken (Dickman et al., 2021). To determine the weight of an edge, a linear equation is applied.

As previously stated, a network analysis can view systems on multiple levels, including: centrality, connectedness, system density, as well as indicate clustering of subgroups (Leung, 2011). However, there are different approaches and levels of analysis that a researcher can take. Web engines use an element-level analysis that aims to answer what the most important element is in online searches. To determine this, Google used a structural measure of relevance. By creating a vertex for each indexed document, a hyperlink corresponding to another document would show a directed or undirected edge from one vertex to another (Brandes & Erlebach, 2005). Depending on the amount of times that a document is referred to determines if that document is relevant. Simply, the more edges that are directed to and from a document creates a higher PageRank. Google’s method of determining PageRank will be recreated in this study when determining the colleges and universities that are the biggest influencers in their communities.

Another example of how network analysis can be approached is on a group-level. Group-level analysis looks at a network and determines the connectedness between each member. The connectedness is determined by the strength of its linkages or pattern of relations (Brandes &

Erlebach, 2005). Doreian and Albert (1989) analyzed local politicians and their strong political ties when voting on a proposed construction of a county jail. After connecting political affiliates with the corresponding group, either the County Executive that is in favor of the county jail or the County Auditor that is in opposition of the county jail, the study found that the voting pattern was predicted by the membership strength. Doreian and Albert's (1989) methodology will be utilized to identify the subgroups of colleges and universities that have strong or similar linkages when analyzing career patterns of Division I women ADs.

Social Network Analysis

Networks have been studied for decades. The beginnings of network mapping can be traced back to four broad categories, including technology networks, informational networks, social networks, and biological networks (Newman, 2018). A network at its simplest form is various points connected by lines that depicts a relationship or flow. For example, the network structure of roads can be mapped to understand the shortest route of transportation. Other examples include the analysis of more complex networks, including conservation stakeholder networks that encourage new initiatives for business success (Vance-Borland & Holley, 2011), and tourism networks that reflect the most visited attractions (Wang, 2011). While there are a myriad of ways to analyze a network, it is important to note the metrics that will affect both how the network works individually and as a whole.

Social network analysis (SNA) is a method to analyze the systematic relationships and patterns in interdependent social entities (Brandes et al., 2017; Wasserman & Faust, 1994). The network of a basketball team, for example, can be analyzed for multiple ties including: location (e.g., the organic flow of the basketball game), membership (e.g., being a part of the same basketball team), and role (e.g., the individuals on a team; Borgatti et al., 2009). SNA has been applied in several academic fields including tourism, business, social sciences, physics, and anthropology (Brandes et al., 2017). Examples of past research include an analysis of co-authorship networks to discover how geographical locations and diverse research intersect (Uddin, et al., 2012); mapping ecological predator-prey interactions to understand biodiversity (Pascual & Dunne, 2006) and utilizing SNA as a tool in the design of disease control strategic plans by creating biological system networks (Pavlopoulos et al., 2011). While SNA is being incorporated in various disciplines, this study will build on the existing literature by utilizing SNA on the career paths of women collegiate ADs.

The Application of SNA to Sport

SNA has been applied within sport management, sport performance, and social structures of sport organization research (Seever et al., 2010). Application of SNA by Onody and Castro (2004) analyzed the social structure of sport organizations in the Brazilian soccer championship. Their study explored the total number of soccer clubs and soccer players who were employed by each club during the championship. If a player was employed at the same club at the same time, an edge would be connected signifying a tie in the network. Results of the study suggest the Brazilian soccer player network is a 'small-world' and is largely determined by changes in players career lengths and time between clubs. When exploring the networks of women collegiate ADs, the method used by Onody and Castro (2004) will provide a helpful roadmap when identifying an AD's past collegiate institutions.

More recently, researchers have found SNA useful when applying it to mapping human behaviors. Wang (2011) used SNA through user-generated content sites to capture tourists'

itineraries during the 2008 Beijing Olympic Games. The study collected data from six user-generated sites to identify the main tourist attractions and the number of people who visited. By using an SNA software, the study was able to map out the movement of the tourists determining the flow from each attraction. Tourist attractions acted as the node. The study revealed main attractions visited by overseas visitors and main tourism movement patterns. Wang's (2011) study will be a building block when constructing the networks of women ADs as the method of identifying main attractions will be used to identify institutions as hubs for women ADs in collegiate athletics.

SNA has also been applied to understand the influences on human behavior when voting on sport-related issues. A study conducted by Sanders (2011) applied SNA to the Bowl Championship Series (BCS) selection system. Up until his study, there was little to no information on the BCS selection voting, and even less information on how voting decisions were made by coaches. In order to determine what influences voting patterns in the BCS bid, Sanders used group solidarity theory, which implies that competition would choose to work together rather than alone given that this means more success in the end (Hechter, 1987; Lichbach, 1995). He created an affiliation matrix using SNA to show the network ties in BCS voting. Football conferences were the actors and votes received by a conference represented a tie in the network. As a result, the study found that "automatic bid conferences band together in hopes of minimizing the presence of teams from non-automatic-bid conferences in BCS bowls" (Sanders, 2011, pp. 275). This example used SNA to capture the importance of looking at a system, not only as an individual component, but as a whole. By doing so, researchers are able to uncover the significance of the network on the discipline itself.

Most recently, and more applicable to this research, SNA has been used to analyze the career paths of Power Five ADs. Dickman et al. (2021) explored the career paths of 65 ADs from the Power Five conferences to build networks, in order to identify patterns in career paths and institutional hiring patterns. By doing so, Dickman et al. (2021) identified alumni associations within the 65 Power Five ADs revealing 24 current ADs holding a position in the same conference as their undergraduate institution. Furthermore, Dickman et al. (2021) uncovered the average amount of career moves to becoming an AD as 8.83 career stops for men, with the shortest career path being two and the longest being 14 moves. For ADs who are women, Dickman et al. (2021) found the average amount of career moves to be 10.75 and the career paths to be longer than their male counterparts. The research highlighted that career moves within intercollegiate athletics is amplified by the connections within the upper echelon. Dickman et al.'s (2021) research is the methodological foundation for this research which will use the same SNA methodology to identify institutions that are considered hubs for women ADs and uncover the average number of jobs a AD who is a woman holds during their career.

SNA in Sport Management

Quatman and Chelladurai (2008a; b) were the first to apply SNA to the academic field of sport management by compiling past collaborations of networks to reveal an increase in publications and networking trends among sport management faculty. By doing so, they were able to show that SNA is related to more than one branch of knowledge. Further research in the field of sport management has shown that SNA can be used to link relationships among several industry groups. Hambrick (2012) studied the use of Twitter for the promotion of sporting events and promotions. The study gathered information from twitter messages sent out by two bicycle race organizers and utilized SNA to track the shared relationships within Twitter. As a result, a mapped-out analysis showed that the respective Twitter followers were able to help spread the

message of the events and concluded that sporting event organizers are able to leverage influential users to help spread promotional material. In the same way, studying career patterns of Division I women ADs will show the leverage of relationships among the upper echelon of collegiate athletics.

A year later, Hambrick and Sanderson (2013) further demonstrated the significance social media plays in sport business by examining sports journalists' coverage of the Penn State scandal through Twitter. The study monitored prominent sport journalists based on Twitter followers throughout major media outlets including television, radio, magazines, etc. The study used snowball sampling to examine who the journalists followed and who followed them. By doing so, Hambrick and Sanderson were able to identify "key names" that showed up repeatedly to construct a social network of media members to uncover how relationships influenced the spread of information. After creating several sociograms to display the growing network, the study concluded that Twitter is a vital tool in sports journalism that aids journalists in gaining exposure to large audiences and positions journalists in a setting to be heard. Similarly, by mapping the career paths of Division I women ADs, "key names" of institutions will be revealed as a significant relationship inside the collegiate athletics network. More recently, Hambrick (2017) has expanded his research into the field of sport communication and its role in the sport industry. The study outlined the evolution of sport communication by creating a visual display of research collaborations among researchers, academic institutions, and topics while identifying new areas of future research. Findings in the social network analysis revealed the most researched topics and key contributors within sport communication research. Importantly, Hambrick showed the importance of expanding SNA in the field of communication to discover new opportunities. Similarly, by expanding SNA into the career paths within intercollegiate athletics, future research can discover new opportunities for aspiring ADs who are women. Other more recent applications of SNA have included applications to classrooms (Cocieru et al., 2020), fans (Katz, Baker, et al., 2020; Katz, Mansfield et al., 2020; Katz et al., 2024), and sport officials (Tingle et al., 2023).

Building the Network

The population is comprised of the 50 ADs who are women from the Division I intercollegiate athletic conferences as of April 16, 2020. This timeframe coincides roughly with the start of the COVID-19 epidemic, ensuring that any data collected was not influenced by the effects of the pandemic and by the most recent seismic changes in conference realignment during the 2021-22 and 2022-23 academic years. Information on the career paths of the ADs will be compiled using current bios on university athletics' websites, along with bios from past employers to check for accuracy and detail. No sensitive or confidential information was used. To address any gap or lack of information on an ADs career, the AD was moved to a "gap" bucket.

As stated, an algorithm will be used to weight the directional edges. To account for jobs at non-Division I schools, jobs were separated into D-II, D-III, professional sports, Non-sport positions, conference level, and national governing body. Each institution or organization that was found to be a career stop for an AD is represented by a vertex i . Whenever a change in position occurs for an AD, a directional edge is created from vertex i to vertex j . The directional edge is then weighted using the algorithm:

$$w_{i,j} = a(1.5) + b(1.5^2) + c(1.5^3) + d(1.5^4) + e(1.5^5), \text{ where}$$

a = total number of career moves to level a;
 b = total number of career moves to level b;
 c = total number of career moves to level c;
 d = total number of career moves to level d;
 e = total number of career moves to level e.

In order to separate levels of position at a university, the generalized job title will be used. For this study, level a represents in a career move to an internship, graduate assistantship, or entry level position; level b represents a career move to a mid-level position; level c represents a career move to an Associate AD position; level d represents a career move to a Senior Associate AD position; and level e represents a career move to an AD position. Any equivalent career moves hold the same weight. Given that experience is considered to be the greatest human capital investment variable, any ADs that were former student-athletes will receive an additional weight of 0.5 for their first position. In result, the weight from vertex i to vertex j will be $w_{i,j} = (1+0.5) * (1.5)$.

If positions are held that are considered outside of athletic administrative roles, they will be weighted into the most comparable levels. For example, positions that include internships, advanced degrees, and competing as a professional athlete will be weighted equivalent to an entry level position. Positions such as assistant coaches, head coaches, and professors will be weighted similar to a mid-level position. Any upper-level position in academia will be categorized with Associate ADs, while head coaches or vice presidents will be weighted similar to Senior Associate ADs. Lastly, any positions that included presidents, owners, or general managers will be considered ADs and weighted similarly.

Results

All 50 women ADs received a Bachelor's degree and 47 (94%) went on to earn an advanced degree. Out of the FBS and AAA divisions, physical education was the most received bachelor's degree while five (26%) ADs in the FCS division received a degree in business administration. The most common graduate degree obtained across all three divisions was athletic administration and sport management with 19 ADs (38%). There were 13 ADs who have received a Ph.D. and five who have earned a Juris Doctorate. There were nine ADs who attended a non-Division I institution for their undergraduate career, including four who received a degree from a Division II institution, four who received a degree from a Division III, and one who received a degree from the Ontario University Athletics conference in Ontario, Canada. Examining alumni association, nine (18%) ADs hold a position at their alma mater (Figure 2). Division I-AAA has the highest amount of current ADs holding a position at their undergraduate institution at six (30%) followed by Division I-FCS at two (11%) ADs and lastly Division I-FBS with one AD (Candice Storey Lee). Additionally, 30 (60%) ADs were alumni of other Division I institutions amongst all three Division I categories.

Table 1 includes an overview of the number of positions held by each AD prior to ascending to the position. The shortest career path was that of Kathy Beauregard (Western Michigan) with a total of five moves. The longest career path was that of Desiree Reed-Francois (University of Nevada Las Vegas at the time of this study and now at the University of Arizona) where it took 14 moves before becoming AD. On average, women ADs across all the divisions made 8.74 career stops. The median number of career stops for current AD positions was nine. Looking further into divisions, the FBS division led the way with an average of 9.55 career stops

Figure 1.

Communities by modularity class

(NOTE: Dots indicate a group or community; size of the dot indicates the density of connection between nodes)

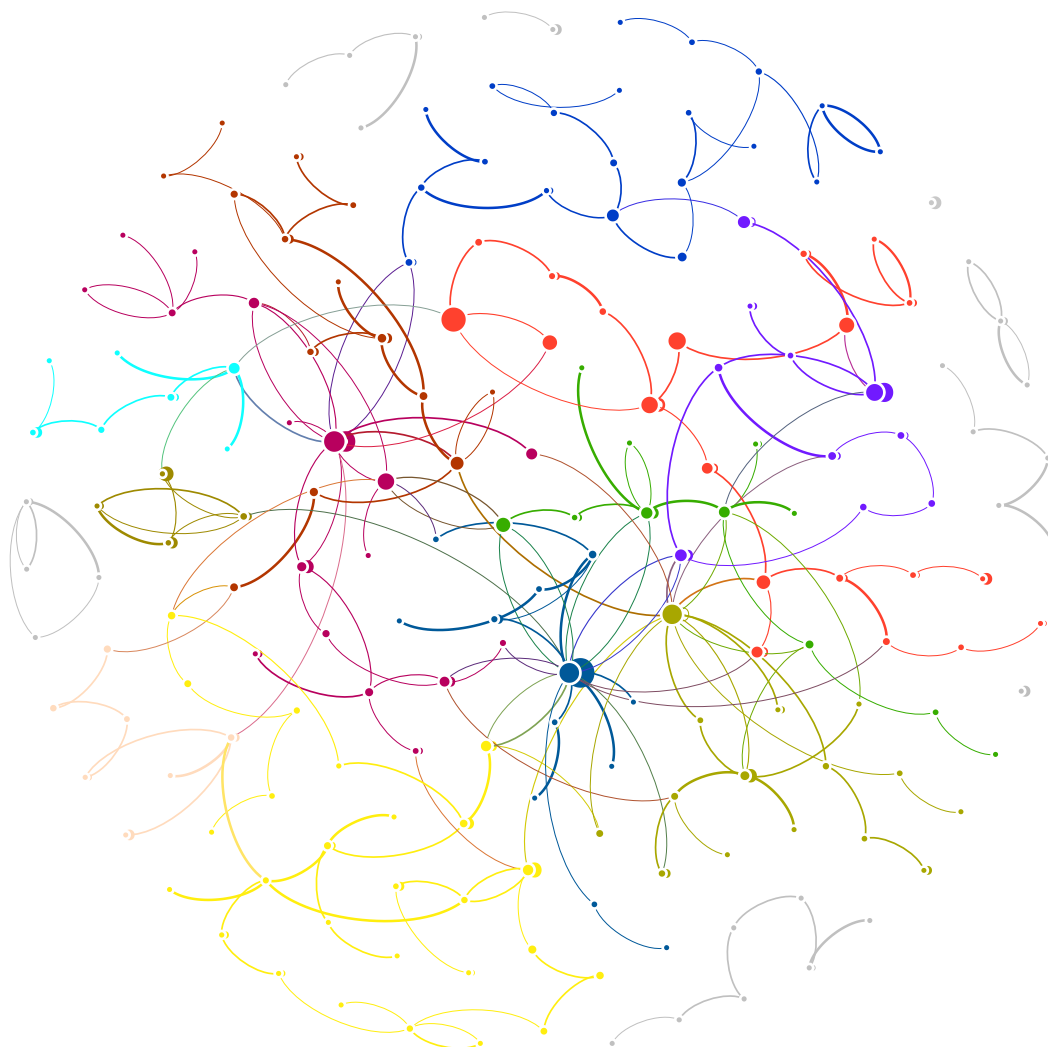


Figure 2.
 AD Alumni Association by Division

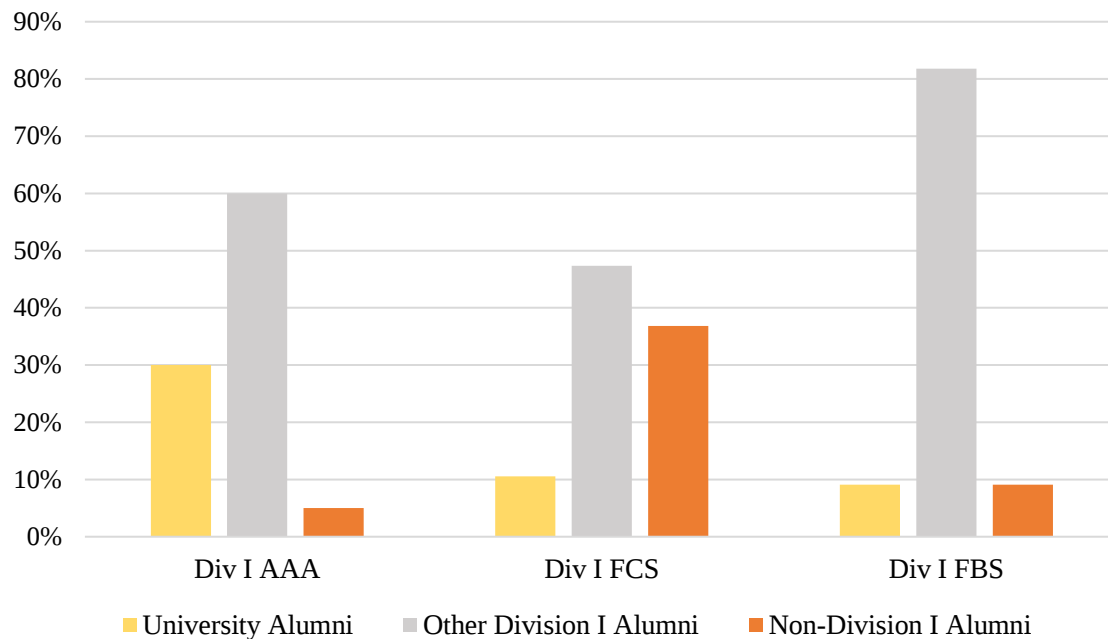


Table 1
 Job Positions Held Prior to Becoming an Athletic Director

Assistant AD	21
Associate AD	28
Sr. Associate AD	43
Deputy AD	15
Compliance	12
Development	8
Student-Athlete Development / Academics	7
Interim AD	8

followed by FCS and AAA with roughly 8.5 career stops each. Of the 50 Division I ADs, 24 (48%) were coaches at one time during their career and 35 (70%) were student-athletes. There were 28 career moves through Non-sport positions, 14 moves through conference positions, 10 moves through the national governing body, one move through professional sport, and one as a professional athlete.

Network Characteristics

The complete matrix was 190 x 190 with 190 vertices and 303 total edges (Table 2). For modularity classes, the network produced weakly connected components within 20 distinct communities. The diameter was 20 with the average path length of 6.97. The average total degree of the vertices was 1.59. The top three institutions with the largest weighted in degree

were Non-sport (71.12), Colgate University (35.28), and San Jose State (35.16); the top three institutions with the largest weighted out degree were Non-sport (88.66), conference (35.09) and Vanderbilt (34.09); and the top three institutions with the largest total weighted degree were Non-sport (159.84), Conference (80.09), and Colgate University (68.72) (Table 3). The three institutions with the highest betweenness centrality were Non-sport ($x I = 4398.58$), Conference ($x = 3806.42$), and NCAA ($x = 3441.67$; Figure 3). The three largest authorities in the network were Non-sport (0.92), UMass (0.15), and UC Berkley (0.14). The three institutions with the highest PageRank values were Portland State (0.013), Non-sport (0.013), and Willamette University (0.012) (Table 4). Washington, St. Louis (D-III) was number five for the top authority score in the network and Willamette University (D-III) was number three in PageRank score. The three largest hubs were Notre Dame (0.38), Northwestern (0.35), and Florida State (0.33) (Table 5). There were 20 communities in the network (Table 6). The average number of vertices in each community was 9.5 ($SD = 7.0$), and the median was seven. The largest community was comprised of 26 vertices in modularity class 9 (MC9). The smallest community, MC14 and MC 16, had 1 vertices. There were 5 unique communities within the network (MC8, MC10, MC11, MC15, and MC17). The data consisted of the 190 institutions that a current woman AD has either worked or studied, along with the levels of positions they held at each institution. Each position was categorized into five levels, and former student-athletes received a bonus on their first career move from their undergraduate institution.

As suggested in research by Hancock and Hums (2016) that found women athletic administrators started their careers in small departments, the number of career moves through either a Division II, III, or NAIA was 47 including three ADs at the FBS level (Jennifer Cohen, Beth Goetz, and Kathy Beauregard). This may suggest that a number of hires still look for ADs who have acquired various technical skills as smaller departments have less personnel. Compared to prior research from Grappendorf and Lough (2006), all 50 ADs received their Bachelor's degree, while 47 (94%) went on to get an advanced degree. Though the amount of ADs who have received an advance degree has increased, ADs who have went on to receive a Ph.D. has decreased. The decrease in ADs receiving their Ph.D. may reflect the shift in intercollegiate athletics toward a more experience focused industry. Additionally, across all 50 ADs studied, the most received master's degree was athletic administration, sport management, or exercise and science at 38%.

Before becoming AD, 43 women held a Senior Associate AD role, 32 held a SWA role, 28 held Associate AD roles, and 21 held an Assistant AD role at one point in their career. While having a position as an Associate or Assistant AD as suggested by Grappendorf et al. (2004) still holds true today, the increase in the position of SWA could advocate for this role as a vital stop before becoming an AD. There were 28 moves through Non-sport positions and Maria Feeley (University of Hartford) is the only AD that did not hold a position in intercollegiate athletics. Feeley served as a legal consultant in various capacities until her appointment to the board of trustees which led to her current position as Interim AD. A total of eight ADs were the interim AD before they became AD.

After analyzing the complete hiring network (Figure 4), it is not a strongly connected component, meaning that there is no way for one person to start at a vertex and be able to connect to all other vertices. When looking at the diameter of the network, the furthest distance between any two connected vertices was 20. The average path length between vertices was 6.97 meaning the least amount of career moves to becoming an AD was between six and seven. The average total degree of the network looks at the in-degree of an institution which denotes the number of ADs they hired and the out-degree which denotes the number of ADs who have left that institution on the way to becoming an AD. This network used a weighted degree which takes

Table 2
Descriptive Metrics for the Network

Total Vertices	Total Edges	Diameter	Average Path Length	Average Total Degree	Modularity	Communities (Mod. Classes)
190	303	20	6.97	1.59	.80	19

Table 3
Top Ten Institutions by Total Weighted Degree

Institution	In Degree	Out Degree	Total Degree	Weighted In Degree	Weighted Out Degree	Total Weighted Degree
Non-sport	11	11	22	71.2	88.7	159.9
Conference	7	8	15	35.1	45	80.1
Colgate	4	4	8	35.3	33.4	68.7
San Jose St.	4	3	7	35.2	31.2	66.4
Vanderbilt	2	3	5	31.5	34.1	65.6
George W.	3	4	7	28.8	31.5	60.3
NCAA	8	8	16	20.1	31.5	53.3
Georgia	2	3	5	22.3	28.1	50.4
Delaware	3	2	5	27.8	20.3	48.1

Table 4
Top Ten Institutions by PageRank

Institution	PageRank	Weighted In Degree	Weighted Out Degree	Total Weighted Degree	Authority Score	Hub Score	Mod Class
Portland State	0.0127	12.656	7.594	20.25	0	0	1
Non-sport	0.0123	71.187	88.655	159.842	0.923	0.028	18
Willamette	0.0118	7.594	7.594	15.188	0	0	1
NCAA	0.0101	20.086	33.188	53.274	0.038	0.009	0
Conference	0.0077	35.093	45	80.093	0.037	0.003	2
Carleton College	0.0070	10.125	6.75	16.875	0	0	1
San Francisco	0.0062	17.719	12.499	30.218	0	0	4
Fordham Univ.	0.0060	10.374	19.2495	29.623	0	0	9
San Jose St.	0.0059	35.156	31.219	66.375	0.006	0	4
UC-Riverside	0.0057	23.344	21.094	44.438	0.001	0	8

Table 5

Top Five Institutions in Authority Score, Hub Score, and PageRank

	Authorities	Hubs	PageRank
1	Non-sport Positions	Notre Dame	Portland State University
2	UMass	Northwestern	Non-sport Position
3	UC Berkeley	Florida State	Willamette University (DIII)
4	Saint Joseph's University	Michigan	NCAA
5	Wash U. (D-III)	Washington	Conference

Table 6

Heads of Communities by PageRank

Modularity Class (MC)	Institution	PageRank	Authority Score	Hub Score	Total Weighted Degree
0	Washington	0.0050	0.0118	0.304	33.188
1	NCAA	0.0101	0.0384	0.009	53.274
2	Portland St.	0.0127	0	0	20.25
3	UConn	0.0032	0.0010	0	29.063
4	San Francisco	0.0062	0	0	30.218
5	UC, Riverside	0.0057	0.0009	0	44.438
6	Conference	0.0077	0.0367	0.003	80.093
7	Notre Dame	0.0042	0.010	0.384	44.625
8	St. Francis	0.0051	0	0	36.124
9	George W.	0.0048	0	0.014	60.280
10	Fordham	0.0060	0	0	29.623
11	Northeastern	0.0025	0	0	21.094
12	UVA	0.0018	0.1108	0.004	27.469
13	W. Michigan	0.0018	0	0	36.938
14	Idaho St.	0.0010	0	0	37.060
15	Miss Valley St.	0.0027	0	0	7.594
16	Mt. St. Mary's	0.0010	0	0	47.499
17	Samford	0.0040	0	0	19.406
18	Non-sport	0.0123	0.9232	0.028	159.842
19	Indiana	0.0049	0.0037	0	25.781

Figure 3.

Hiring Network of Current Division I Women ADs

(NOTE: The colors highlight the communities, and the vertex size is proportional to its total weighted degree. The larger vertex institutions denote the schools in those communities with the greatest Hub score).

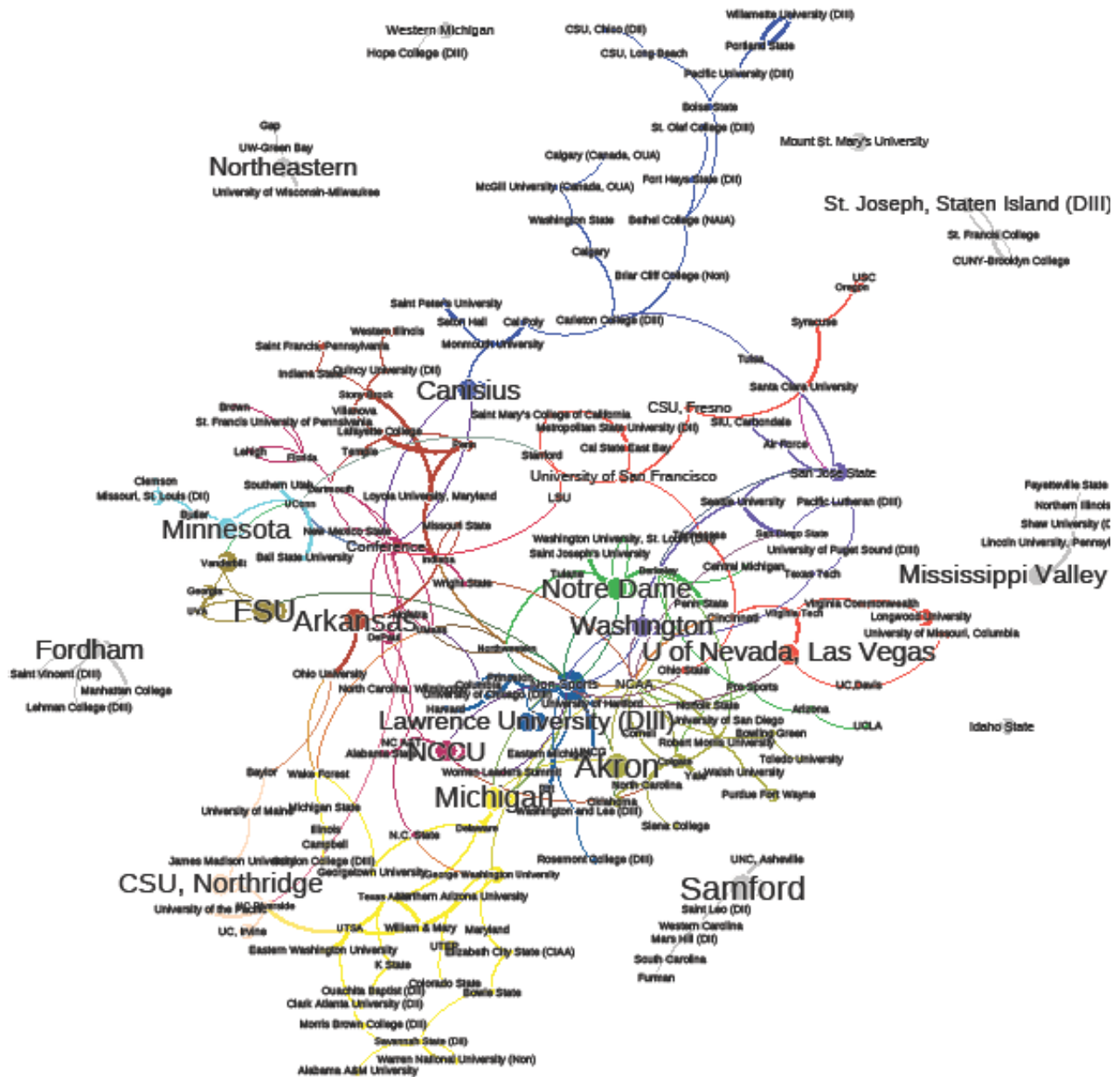
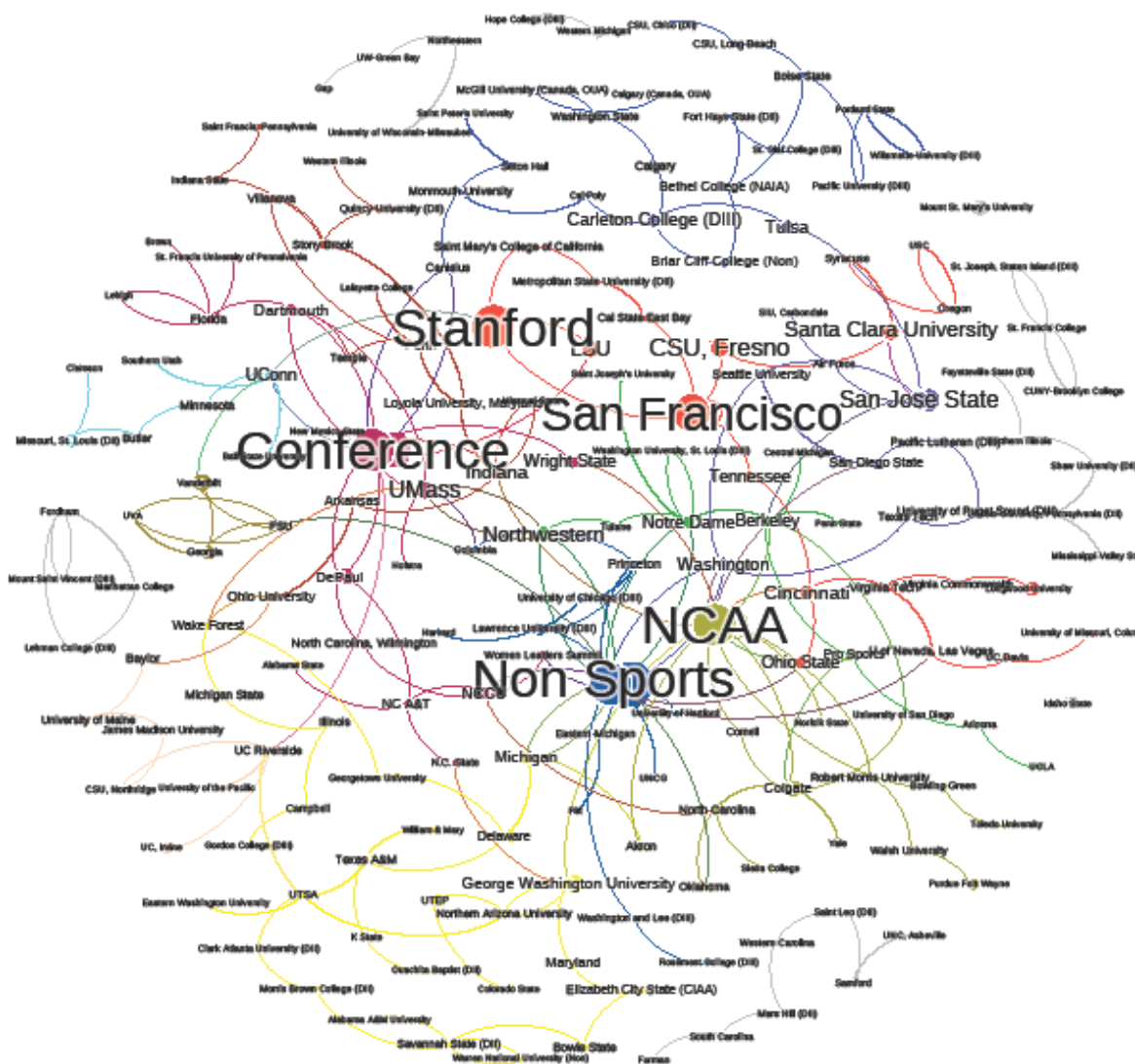


Figure 4.

Fruchterman Reingold with Top Five Betweenness Centrality Institutions (Conference, NCAA, Non-sport, San Francisco, and Stanford).



into account the value assigned to a career move of a former student-athlete. As a result, the average number of ADs who were hired by the institution and left for another job was 1.59.

Non-sport positions had the highest total weighted degree at 159.9 and largest amount of moves through this position totaling 22. Vertices including Conference, Colgate University, San Jose St., and Vanderbilt which had large weights but less in and out degrees signify that the change in job position when that person left was greater than when they came in. For example, an Associate AD that is hired at Colgate that then leaves for an AD position elsewhere gives that change in position a greater weight than others. A limitation of this study is that it only counts outside hires meaning that any hires made within the institution were not calculated toward the total weighted degree.

When looking at the network through communities, there is further evidence that a sparse connection is within the network (Figure 3). Out of the 19 communities, 13 had a Division I, II, NAIA, CIAA, or OUIA institution signaling there are no division or conference affiliations amongst schools. Modularity Class 2 had the second most institutions make up the community at 20 with half being a non-division I institution. The largest community was comprised of 26 institutions and the smallest community had one institution (MC16). There were five unique communities which are defined as career paths that included institutions which were unique to that individual AD. These ADs with unique career paths include Irma Garcia (MC8), Marianne Reilly (MC10), Amanda Braun (MC11), Dianthia Ford-Kee (MC15), and Janet Cone (MC17).

Betweenness centrality signals the “stepping stones” of an ADs career. When measured, the network shows which institutions or fields showed up toward the middle of an ADs career path the most. Non-sport position came in first with the highest overall betweenness centrality of 4.40 average career stops. The second highest betweenness centrality was a conference position at an average of 3.81 career stops and third was a position at the NCAA level averaging at 3.44 career stops. After looking at the network as a whole, many women ADs either started or accepted a mid-level position at a Non-sport position, Conference or NCAA level. This betweenness centrality is significant because it reveals that there could be greater mentoring opportunities for women outside of individual institutions. Additionally, this can provide insight for younger women on what their mid-level career move should be if they want to aspire to be an AD. The remaining top 10 institutions were University of San Francisco, Stanford, Santa Clara University, CSU Fresno, San Jose State, UMass, and LSU. These institutions are noteworthy due to the fact that ADs were working at a division I institution by their second to third career move.

Institutions labeled as authorities in the network hire ADs from hubs at a higher career position. The top five authorities were Non-sport positions, UMass, UC Berkeley, Saint Joseph’s University, and Washington, St. Louis (DIII). Non-sport position hired six positions at the Senior Associate level and nine at the mid-level position. At UMass, there were four hires at the entry-level position from four of the top 20 hubs including Northwestern. Out of the three hires at UC Berkeley, two were mid-level positions and one was an AD hire from Notre Dame. At Saint Joseph’s University, a single hire at the AD position came from Notre Dame. While this was surprising, it holds true because the one position that came in left as an AD which is the highest rank for job positions. And lastly, Washington, St. Louis (D-III) hired an entry level position from Notre Dame. It is important to note that all five authorities mentioned above hired at least one position from Notre Dame at an equal or higher position. Additionally, out of the Non-sport position hires, six were from a previous field of legal affairs and three were from an executive vice president role.

Hubs are institutions that send out ADs to authorities. The institution with the top five highest hub scores were Notre Dame, Northwestern, Florida State, Michigan and Washington. Out of the six positions coming out of Notre Dame, two went on to AD positions at Division I schools (Sandy Barbour and Jill Bodensteiner). From Michigan, one of the five positions out of the institution was an AD hire (Chrissi Rawak). The current AD at Washington, Jennifer Cohen, was promoted within to the AD position after holding an Associate AD role in development. In total, the five institutions had 10 ADs hired at an Associate AD level or higher. It is important to note that all five hubs are institutions at the FBS Division-I level and are considered the most effective at getting ADs high level jobs for their next step.

Institutions with the highest PageRank are considered the greatest influencers in the network. The institutions PageRank value was increased when they hired from and sent out ADs to other influential institutions. Portland State had the highest PageRank with only one AD coming in and out of the institution. While initially this was surprising, it made sense seeing that

Valerie Chun (Portland State AD) came through Portland State first as a Senior Associate AD, left for an AD position at Willamette University (D-III), and then returned to Portland State as the AD giving the institution a higher PageRank. Non-sport position ranked second with 20 career moves to other influential schools including Michigan, Notre Dame, Northwestern and Washington. Willamette University (D-III) was third due to the institutions hand in sending Valerie Chun to Portland State. The fourth highest ranked institution in PageRank was the NCAA with nine total career moves. Conference level rounded out the top five for PageRank with 12 career moves transitioning to other influential institutions.

Comparison Between Division I AD Career Paths for Women and Men

When comparing the career paths of Power Five ADs (Dickman et al., 2021), there was a similar percentage of former student-athletes in both men (64%) and women (70%). However, when looking at the percentage of women who previously coached to their counterparts who are men, it was significantly higher at 24 (48%) ADs compared to 13 (20%) ADs. The higher percentage of coaching experience among women ADs could be explained by the importance placed on experience in the collegiate athletics industry and the value placed on human capital investment (i.e., education, experience, and training) as a woman (Cunningham & Sagas, 2004; Wright et al., 2011). Additionally, the greater degree of women coaches to men suggests an extra pre-requisite that presidents look for when hiring for an AD (Lumpkin et al., 2015).

On the contrary, the results found a significant difference in career moves through professional sport. Dickman et al (2021) found that of the 65 Power Five AD career paths analyzed, there were a total of 23 stops in professional sport. In comparison, out of the 50 division I women ADs, there was only two career move through professional sport including Shaney Fink, AD at Seattle University, who was a professional volleyball player and Desiree Reed-Francois, AD at the University of Nevada Las Vegas, who spent time as a legal associate for the Oakland Raiders and the NFL's Management Council. The difference in career moves through professional sport could be explained by the historical practice of hiring women from within rather than from outside organizations due to the fact that they can prove their competencies and worth to peers and superiors (Lumpkin et al., 2015).

When analyzing the network, there were 28 strongly connected components and 10 communities in the Power Five men network compared to no strongly connected components and 20 communities in the women division I network. As the results suggest, ADs who are men have a greater connected community among institutions as compared to women ADs. The lack of connection can be represented by the fewer ties that women ADs have compared to ADs who are men. The strongly connected network may be explained by the accessible mentorship to aid men to AD positions (Cunningham & Sagas, 2004) and the lack of informal networks among men and women personnel (Katz et al., 2018). Additionally, a much more connected network allows for resources and information to be passed to institutional members allowing for peers to be promoted to leadership positions. Women ADs have double the communities than that of male ADs signaling much fewer ties amongst institutions and career paths. The disparity between the amounts of communities could explain why women have not advanced as quickly to the AD role as their male counterparts as many organizations seek to fill leadership roles from within setting an extra barrier for women who are already underrepresented in intercollegiate athletics (Johns, 2013). With numerous amount of communities and little connections between them, the network signifies a lack of mentorship in the intercollegiate athletics space among women and the importance of recommendations from institutional peers (Bower & Hums, 2014).

However, while the network looks sparse now, the outlook for women in an AD position is increasing year-after-year signaling greater mentorship in the future (Axios, 2019).

No institutions were an authority for both women and men ADs, which is significant because it reflects an institutional silo between the hiring network of men and the hiring network of women. Taking a look at institutional hubs, Notre Dame was the only school that ranked in the top five institutions for both women and men ADs, signifying an organizational importance amongst the AD network. This finding is consistent with the results from the 2018 study, which found Notre Dame as the second largest eigenvector affiliation for the AD position (Katz, et al., 2018). An institution with a high eigenvector affiliation incorporates the number and centrality of nodes (Borgatti et al., 2013; Prell, 2012). The more nodes and higher centrality, the more popular an institution is amongst a network. The Non-sport position was ranked among the top five in PageRank for both men and women ADs.

The demographics of women ADs have marginally changed, with a lesser percentage of ADs having been a coach or having coaching experience. However, there is still a high percentage of ADs who were former student-athletes. Majority of ADs went on to get an advanced degree compared to their male counterparts suggesting that women see education as a qualification to becoming an AD. On the way to becoming an AD, there was a large percentage of women ADs that worked either in D-II, D-III, or NAIA before being hired at a D-I institution.

With the changing landscape of collegiate athletics, job roles and titles have shifted for women as well. The SWA title was held by over half of the women ADs, with roles at the senior executive level being held by 43 of the ADs. Compared to ADs who are men, career moves from outside of collegiate athletics and Non-sport were few. No institutions were an authority for both women and men ADs, which is significant in itself because it reflects an institutional silo between the hiring network of men and the hiring network of women. Additionally, the numerous amounts of communities that make up the women AD network suggests a severe lack of cohesion among women and men AD colleagues. Notre Dame was the only school that ranked in the top five institutions for both women and men ADs, signifying an organizational importance amongst the AD network. These insights based on a novel comparison of the career paths of women and men ADs generate a multitude of implications for the intercollegiate athletics industry, most notably regarding the opportunities and networking required for a woman to attain the position of AD compared to their male counterparts.

Discussion and Implications

Within the changing landscape of collegiate athletics, job roles and titles have shifted for women as well. The SWA title was previously held by more than half of the women ADs, with roles at the senior executive level being held by 43 of the ADs. Compared to ADs who are men, career moves from outside of collegiate athletics and Non-sport were few. No institutions were an authority for both men and women ADs, which is significant in itself because it reflects an institutional silo between the hiring network of men and the hiring network of women. Additionally, the numerous amounts of communities that comprise the women AD network suggests a severe lack of cohesion among men and women AD colleagues. For example, Notre Dame was the only school that ranked in the top five institutions for both women and men ADs, signifying an organizational importance amongst the AD network. These insights based on a novel comparison of the career paths of women and men ADs generate a multitude of implications for the intercollegiate athletics industry, most notably regarding the opportunities and networking required for a woman to attain the position of AD compared to their male counterparts. The purpose of this research was to analyze the career paths of current NCAA

Division I women ADs in order to build and identify networks within intercollegiate athletics. Grounded in SNA, this study yields a greater insight into the institutional network among women ADs. This is an important contribution and highlights the lack of mentorship, opportunities, and advancement for women ADs.

Theoretical and Practical Implications

Grounded in SNA, this study yields a greater insight into the institutional network among women ADs. This is an important contribution and highlights the lack of mentorship, opportunities, and advancement for women ADs. The literature on social networking analysis and women in collegiate athletic positions has revealed numerous themes that reflect what women encounter on their path toward becoming an AD. While Title IX has increased the number of jobs within the athletic department, it has not reflected a greater network among ADs who are women. Women who aspire to be in the AD role still face a lack of mentorship and institutional opportunities. Specifically, there is the need for institutions to foster greater networks amongst divisional conferences and the NCAA. This research also highlights the institutions with the greatest influence among a woman's career path. One takeaway from these results is that in order to be influential, it is not the number of career moves through the institution that effects PageRank, but rather the career moves value that is most important. With this in mind, institutions should be aware of how they are developing their administrators for greater success in the future.

When examining the demographics, the results demonstrated that 70% of ADs who are women were former student-athletes, while 48% were coaches. Mentorship amongst student-athletes particularly may be advantageous to creating a greater network to former, current, and aspiring ADs. The high volume of former student-athlete representation amongst ADs could be seen as an extension of the value placed on the experiences had as a student-athlete (Cunningham & Sagas, 2004). When examining Division I further, the FCS division has 15 former student-athletes followed by the AAA at 14. The FBS has the lowest percentage of former student-athletes at six. As nearly half of the ADs were coaches, this result can suggest that the critical background of leading and budgeting your own program is vital as athletic departments are generating and spending money at a record high. Additionally, the research showed a high betweenness centrality is reflected amongst the NCAA institution and Conference institution. Incorporating annual conferences among the different divisions may add to the opportunities for cross networking amongst women and men that would otherwise never happen. When looking at the results from the betweenness centrality measurement, it is important to note that the top three career moves considered a significant "stepping stone" were in a Non-sport, Conference, or NCAA level position. While these were mostly mid-level career moves for women ADs, athletic departments may consider emphasizing professional development outside of collegiate athletics as a strong career move.

Limitations and Future Research

While this study offers a novel examination of the career paths of women ADs utilizing SNA, there are several limitations that must be acknowledged. In turn, they provide multiple opportunities for future research. A major limitation of this work is that its focus on career paths necessarily means that it is focused solely on the job positions, both the type and number, prior to an AD ascending to the AD position. Thus, beyond these facts it is unknown what additional factors may have played a role in the career paths of these professionals, and why some ascended

to the AD position with fewer or more prior positions. Due to the fact that only the type and number of prior positions were being analyzed, biographies of the ADs were utilized as source material. Thus, there may be additional details omitted from these materials that may provide additional context, such as the reasons why ADs may have been promoted or reassigned. Future research is necessary that examines why specific ADs were able to be promoted into the position with fewer steps, and why some careers included more positions prior to the promotion to AD. In addition, now that women ADs have become more prevalent there have been several instances of a woman AD moving from one Power Five institution to another. These include Jennifer Cohen moving from the University of Washington to the University of Southern California, and Desiree Reed-Francois moving from the University of Missouri to the University of Arizona. Additional research is needed that examines the career paths of women ADs that move from one high level position to another.

In addition, this study is limited solely to ADs in NCAA Division I. Thus, it is unknown if these findings are generalizable beyond Division I, and into Division II and III. Future research could extend this study into an examination of Division II and III AD careers in order to compare and contrast the hiring network of NCAA institutions at additional levels. Finally, this study spotlighted one moment in time rather than a longitudinal analysis, specifically as of the onset of the COVID-19 pandemic in March of 2020. Over the past four years the intercollegiate athletics industry has changed significantly, both due to the effects of the pandemic and due to the change in the enforcement of a student-athlete's ability to leverage his or her Name, Image, and Likeness (NIL), which began in 2021. Thus, it is unknown how the career paths of women ADs may have been influenced due to these two events. Future research is now necessary to examine how career paths may have changed over the subsequent time period. For example, results from the new NIL era could be compared and contrasted to data from this study in order to provide a longitudinal analysis of change over time in the career paths of women ADs.

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