Breaking Barriers: Unveiling Gender Disparities in Corporate Board Career Paths using Deep Learning

YUHAO (JET) ZHOU, FRM

YZHO82@UWO.CA

CO-AUTHORS: CRISTIAN BRAVO, MATT DAVISON, MARIA ÓSKARSDÓTTIR

Motivation & Gap

What is a board in corporation? Why is the board important?

The benefits of having **a diverse board** has been widely studied in the past decade.

Knowing that a diverse board offers benefits is good. But **little** has been studied about **who board members are** and **why have they** been promoted to this position.
- Director appointments: It is who you know (Cai et al., 2022)
- *Gap*:
  - The specific **influence of professional, educational, and social networks** on these pathways, especially when **analyzed through a gender-focused perspective**, has **not** been thoroughly explored.

Objectives

➤ Examine the **varied influence of five distinct networks and roles** on board director appointments, highlighting the differential effects across genders.

➤ Identify **unique strategies utilized by male and female senior managers** with analogous backgrounds and career trajectories in leveraging professional networks for board positions.

➤ Uncover **barriers impeding female's advancement into board** roles and propose **actionable insights to enhance gender diversity** within the highest level of corporate governance.
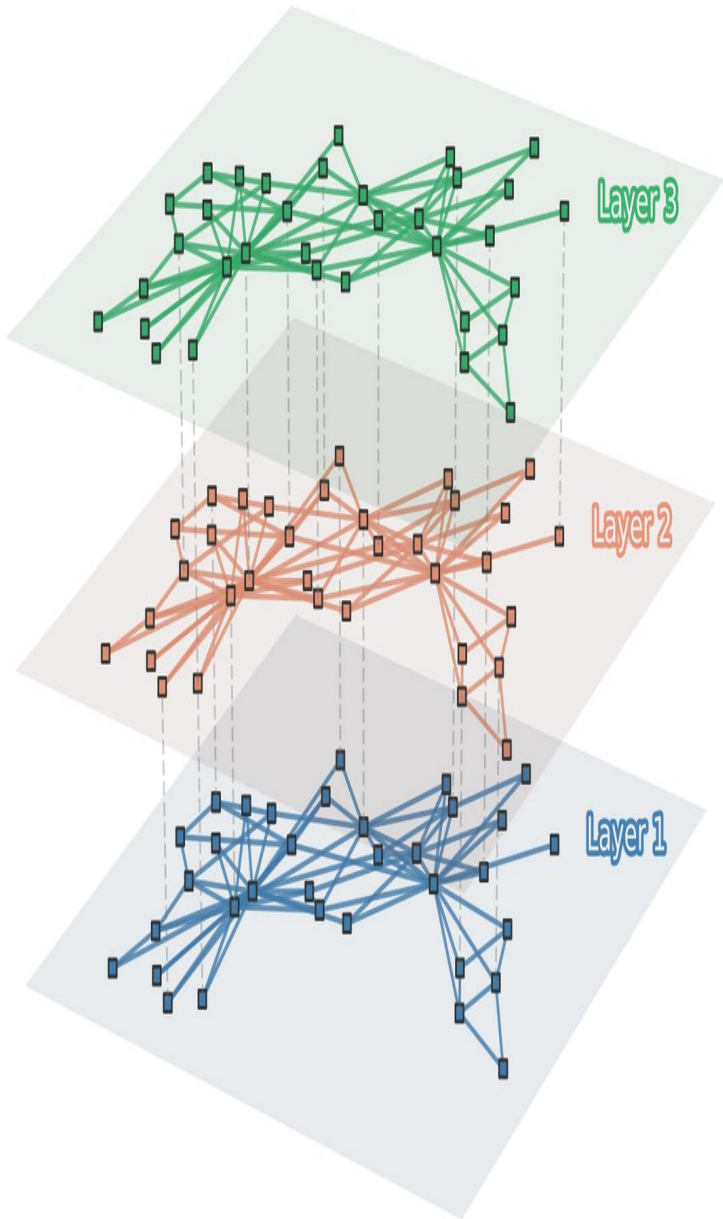
Data (from BoardEx)

CORPORATE

➢ Corporate Information

➢ Board of Directors

➢ Management Team

INDIVIDUAL

➢ Career History

➢ Education

➢ Social Engagement

Network – 5 Sources

Education

Education

(EDU)

Working

Current Employment

(CE)

Prior Employment

(PE)

Social Engagement

Current Social Engagement

(CSE)

Prior Social Engagement

(PSE)

Network – 5 Centralities

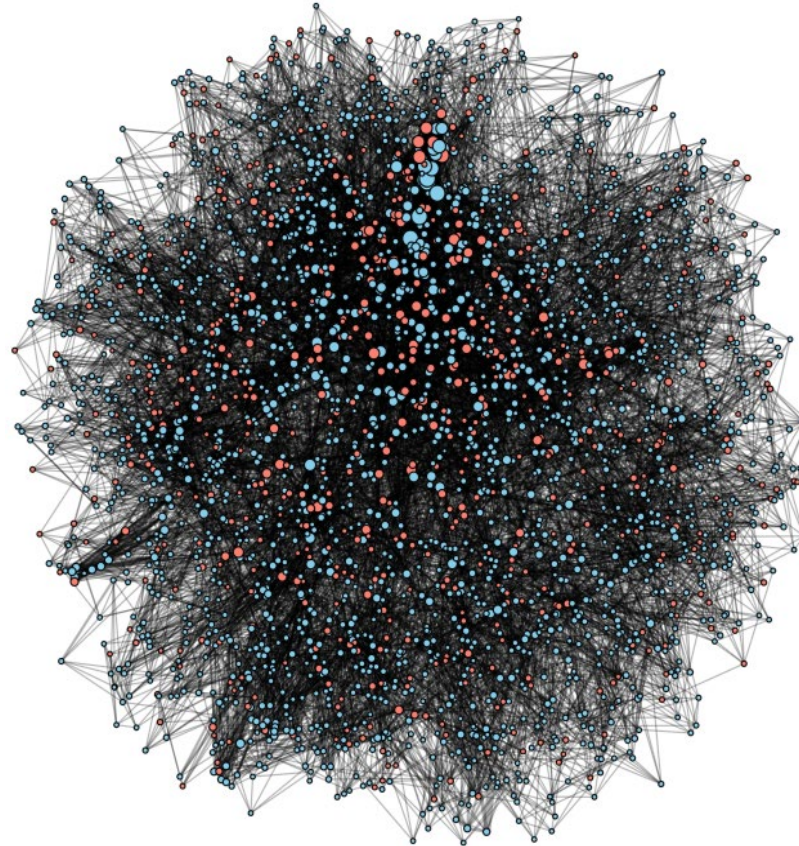|	
Degree	Number of direct connections
Betweenness	Number of times an individual lies on the shortest path
Closeness	How close an individual was to all other individuals in the network
PageRank	Assessed an individual's importance within the network based on the number and quality of connections
Personalized PageRank	A variation of PageRank, specifically tailored in our study to emphasize connections with current board members

Size of Networks

Canadian Market (After 2000)

- 700+ Canadian Public Firms
- 19,000+ Senior Managers & Board Members
- Over 2 Million Connections
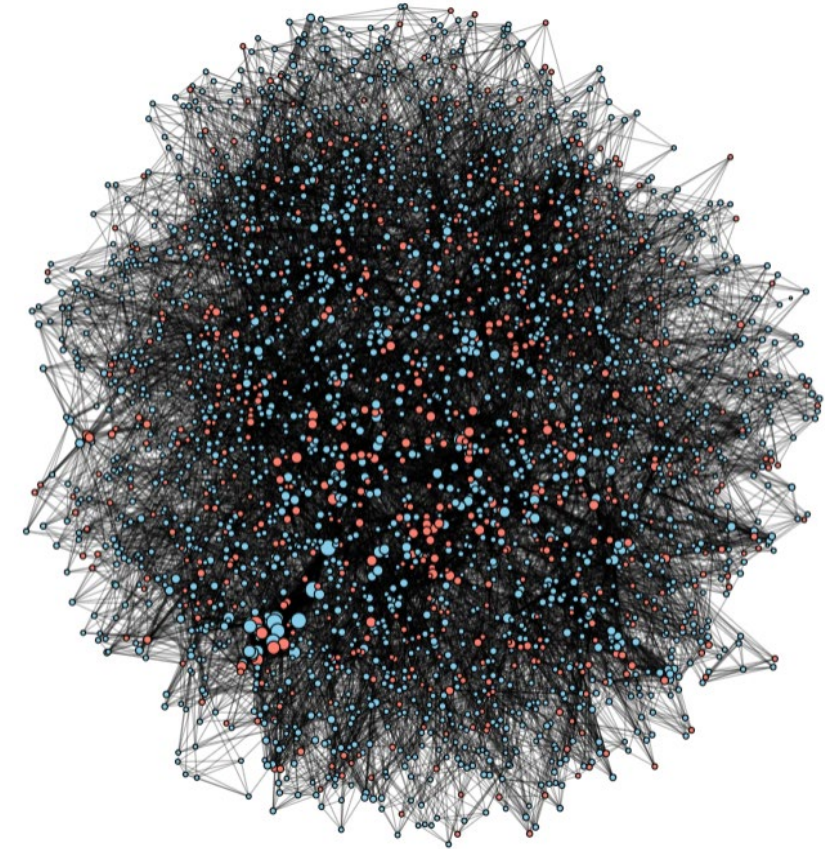- Less Than 25% are Females
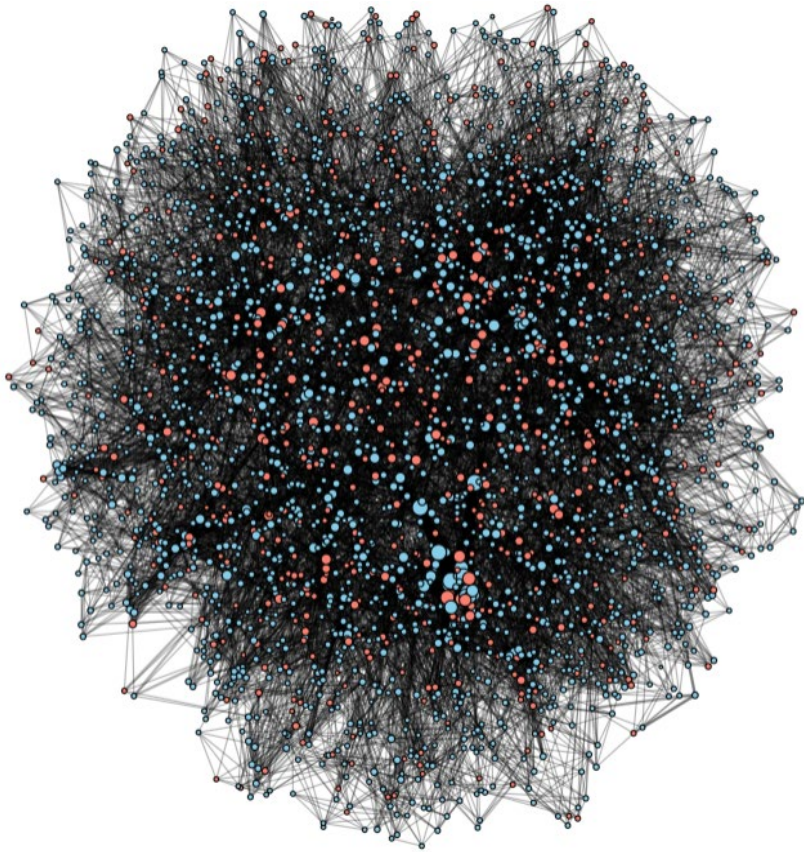
Current Employment   Education   Current Social Engagement

Network visualization of **current employment** (left), **education** (middle) and **current social engagement** (right) connections in 2020, highlighting individuals with **degree five or more** while differentiating between male (light blue) and female (salmon) individuals. Node size represents the size of connections, emphasizing the gender-specific networking patterns within Canadian publicly traded firms.

Network Size Differences by Gender
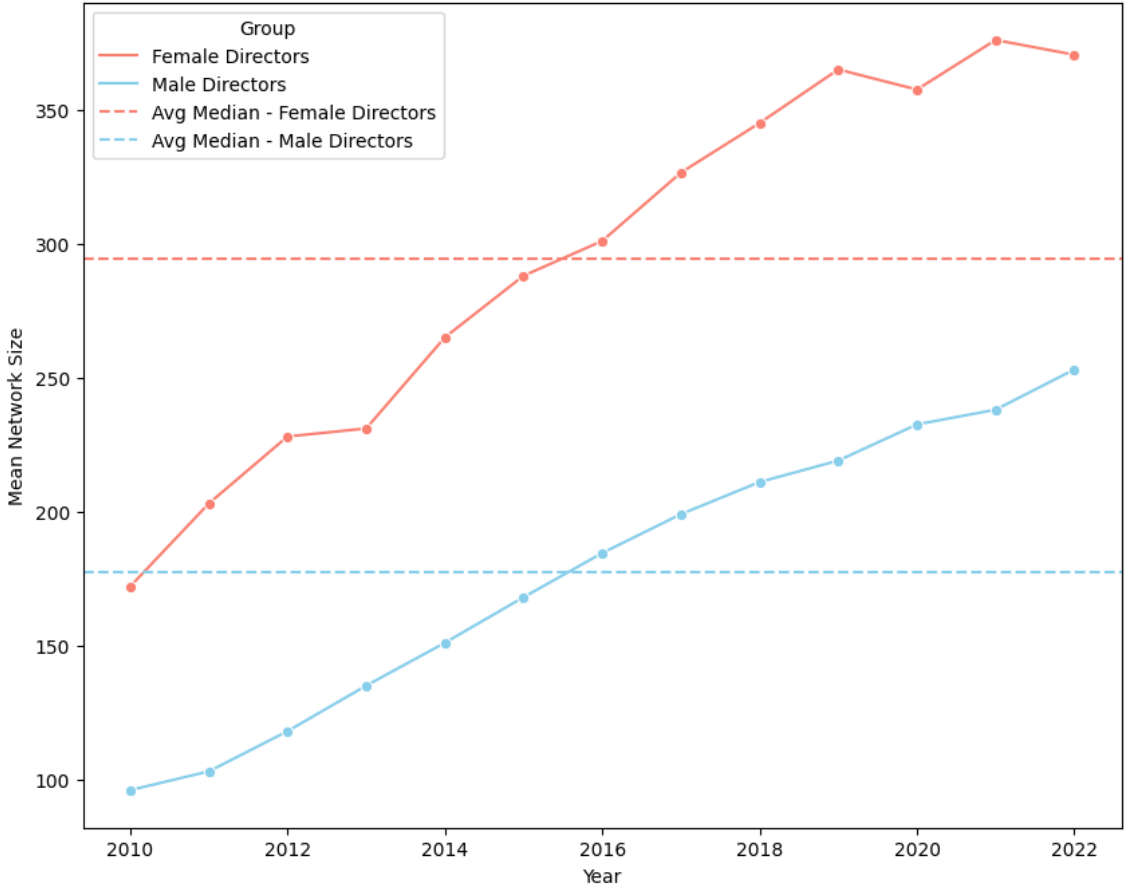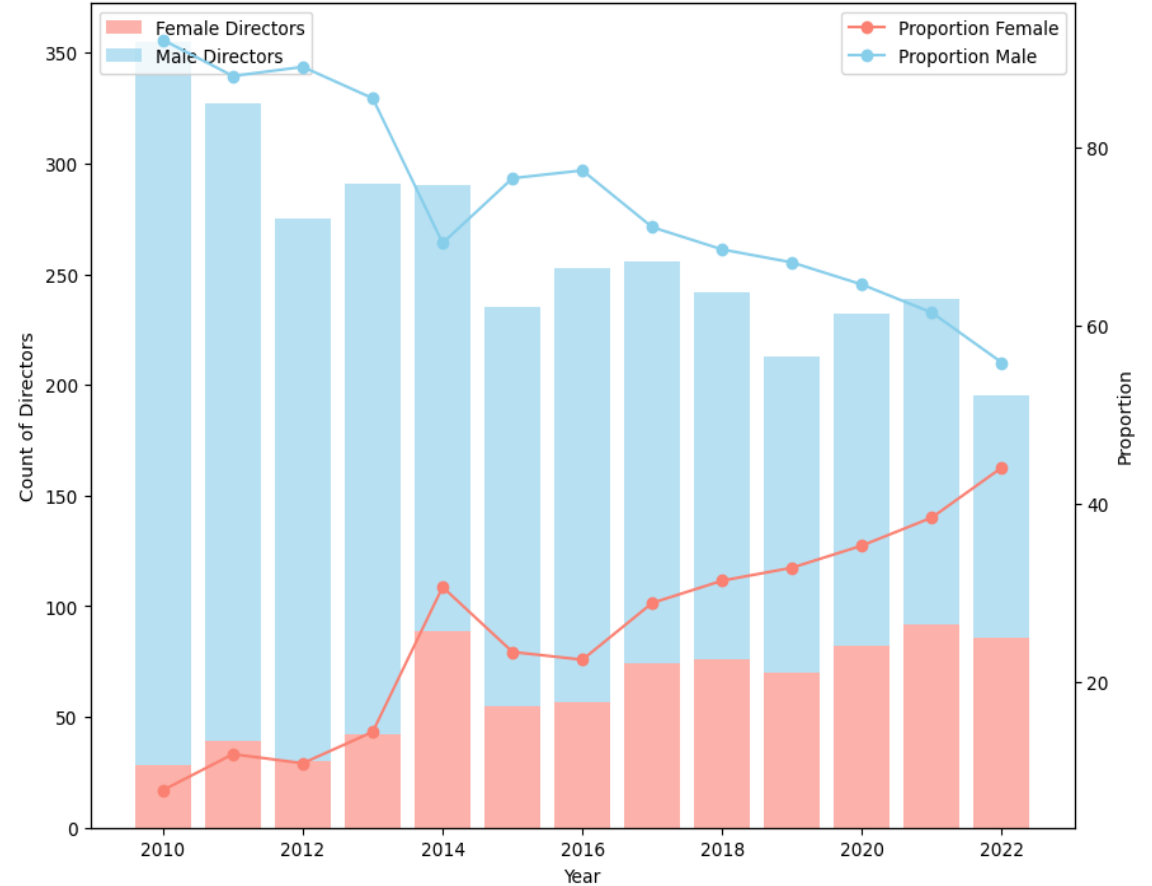
Matching Methodology

In our causal analysis, we paired female and male candidates on a one-to-one basis, aligning them according to their **career trajectories** and **demographic** characteristics.

➢ **97%** of females in the dataset are matched.

➢ **Career Trajectory**
a) Positions held
b) Sector employed
c) Company indices
d) Types of companies

➢ **Demographics**
a) Education level
b) Professional tenure
c) Nationality

Steps on Matching

Transforming career trajectories into sequences

- Employing Transition Rate Matrix to calculate transition cost between states

Calculating a dissimilarity matrix among sequences

- Employing Optimal Matching based on transition costs

Integrating static demographic features

- Generating another dissimilarity matrix to integrate with the previous one using sequential data

Implementing this gender-based matching using an integrated dissimilarity matrix

Models & Evaluations

➢ With **matched** individuals

➢ Our study employs **Long Short-Term Memory** (LSTM) networks to navigate the complexities of sequential professional networking data, accommodating the variability in sequence lengths.

➢These LSTM models are specifically employed **to trace and analyze the evolution of individuals' networking activities over time**.

➢ To assess the impact of various networks and roles, we utilize an **exponentially weighted AUC**, which places greater emphasis in more recent years.

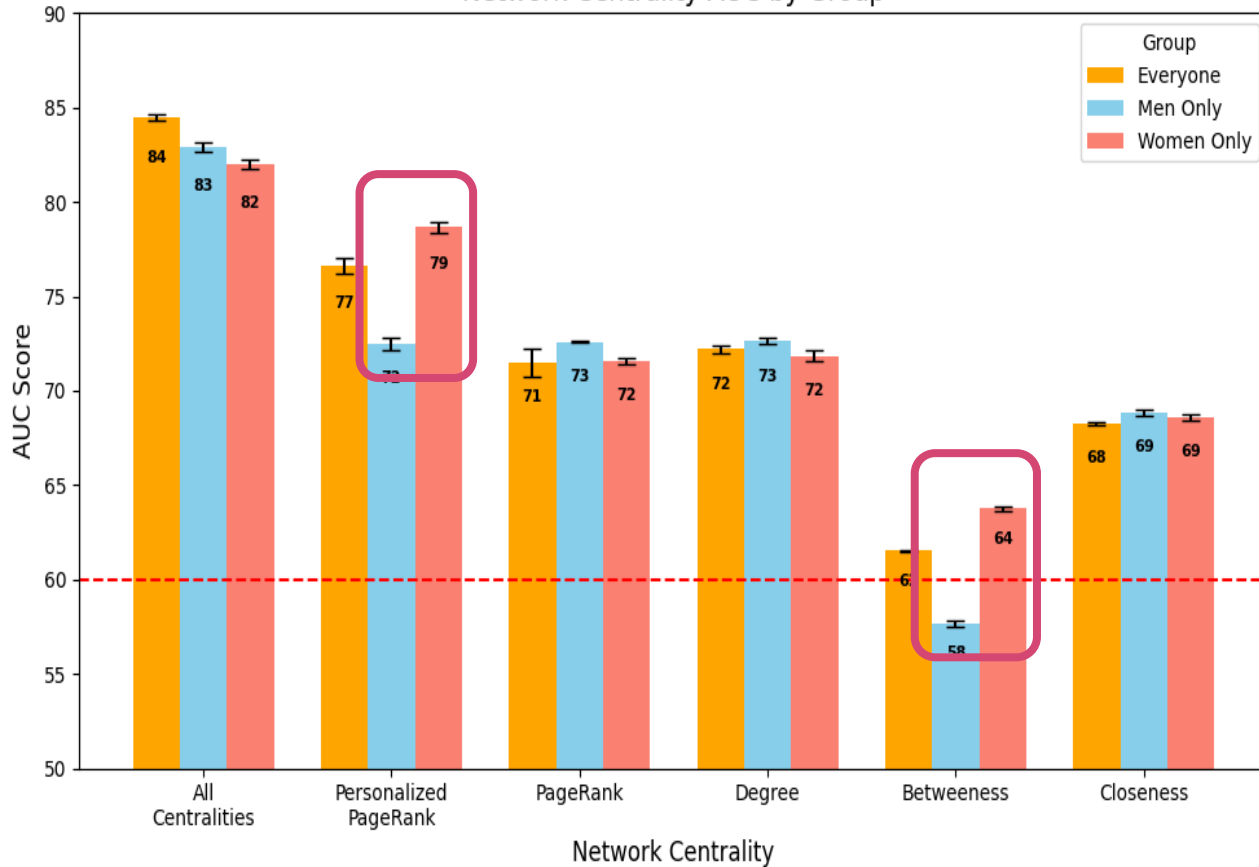# Results (Network Sources)

Network Source AUC by Group
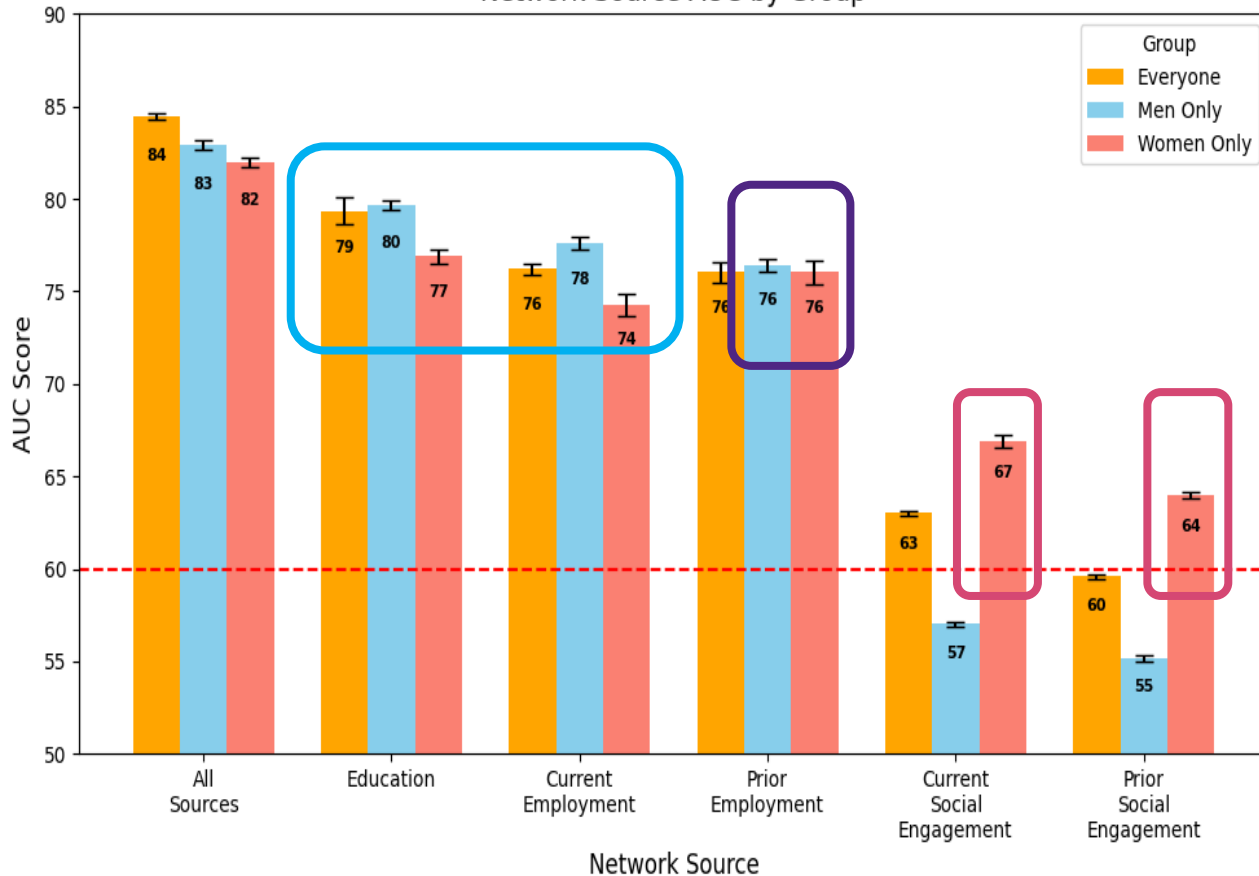
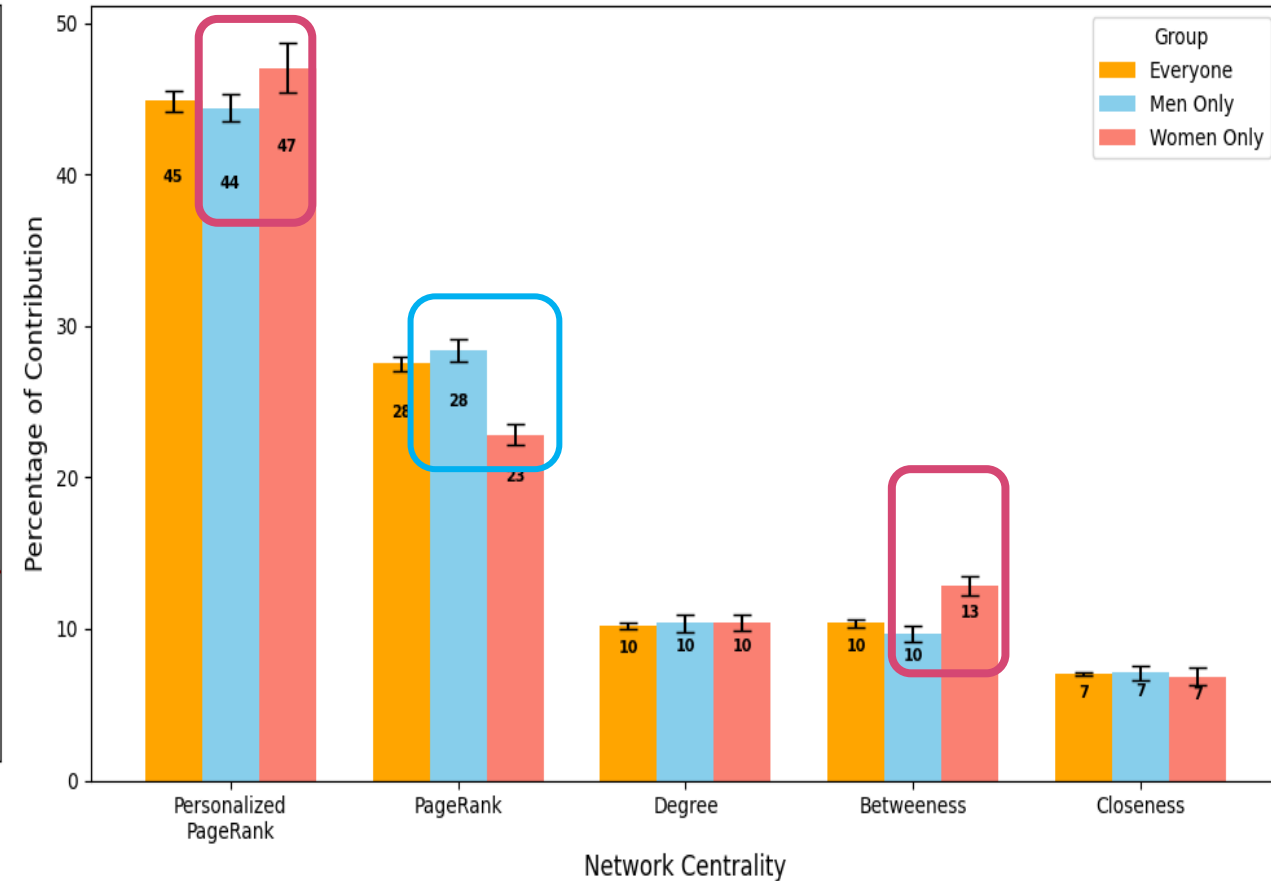Network Source Importance by Group
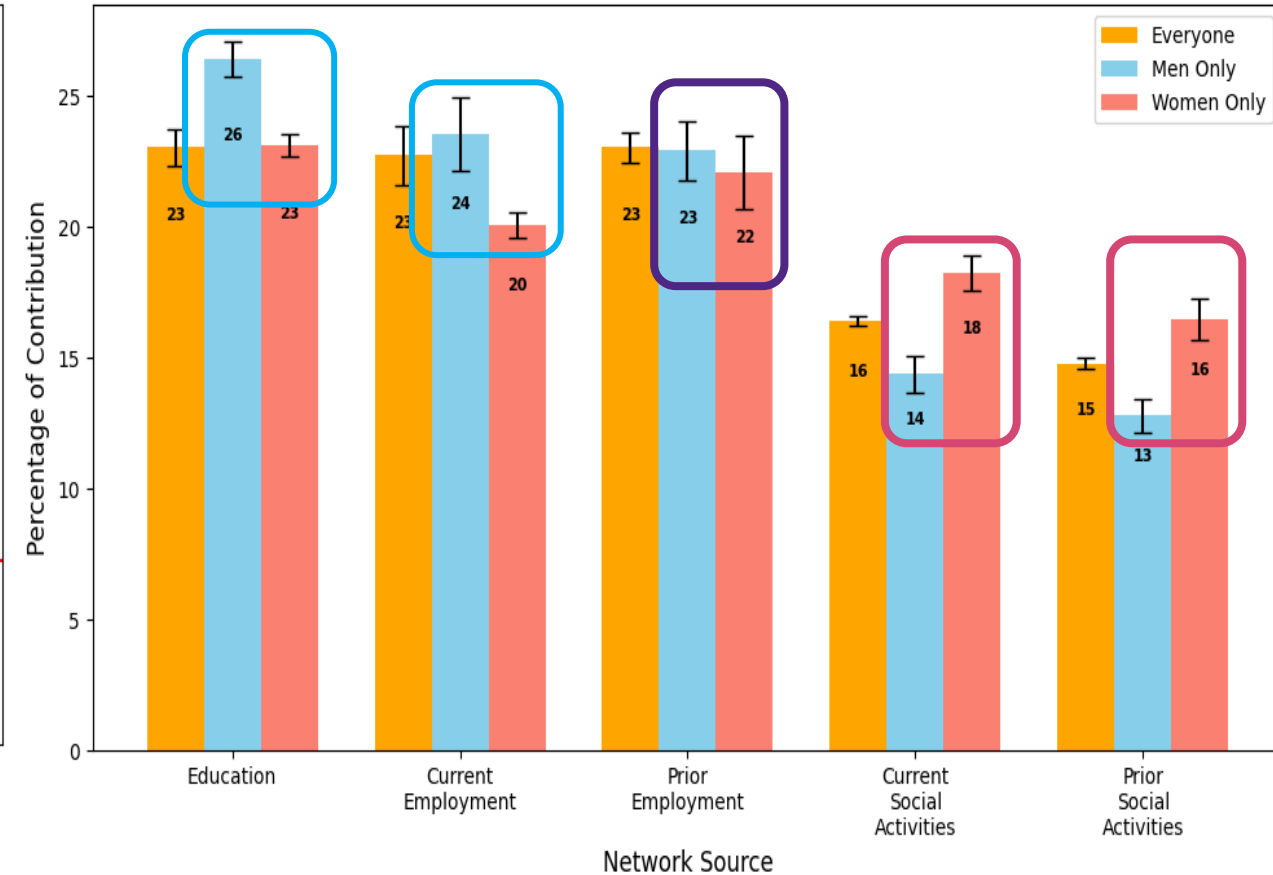
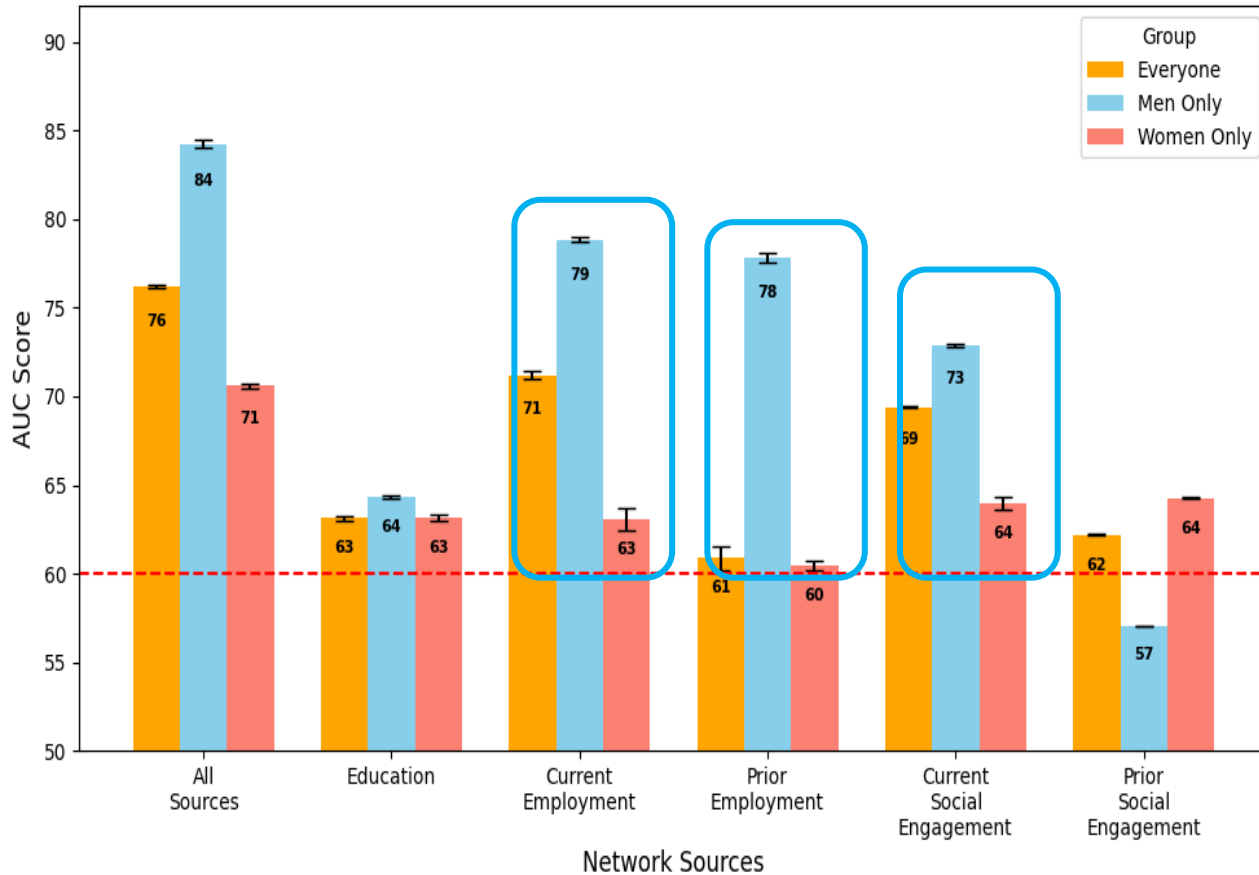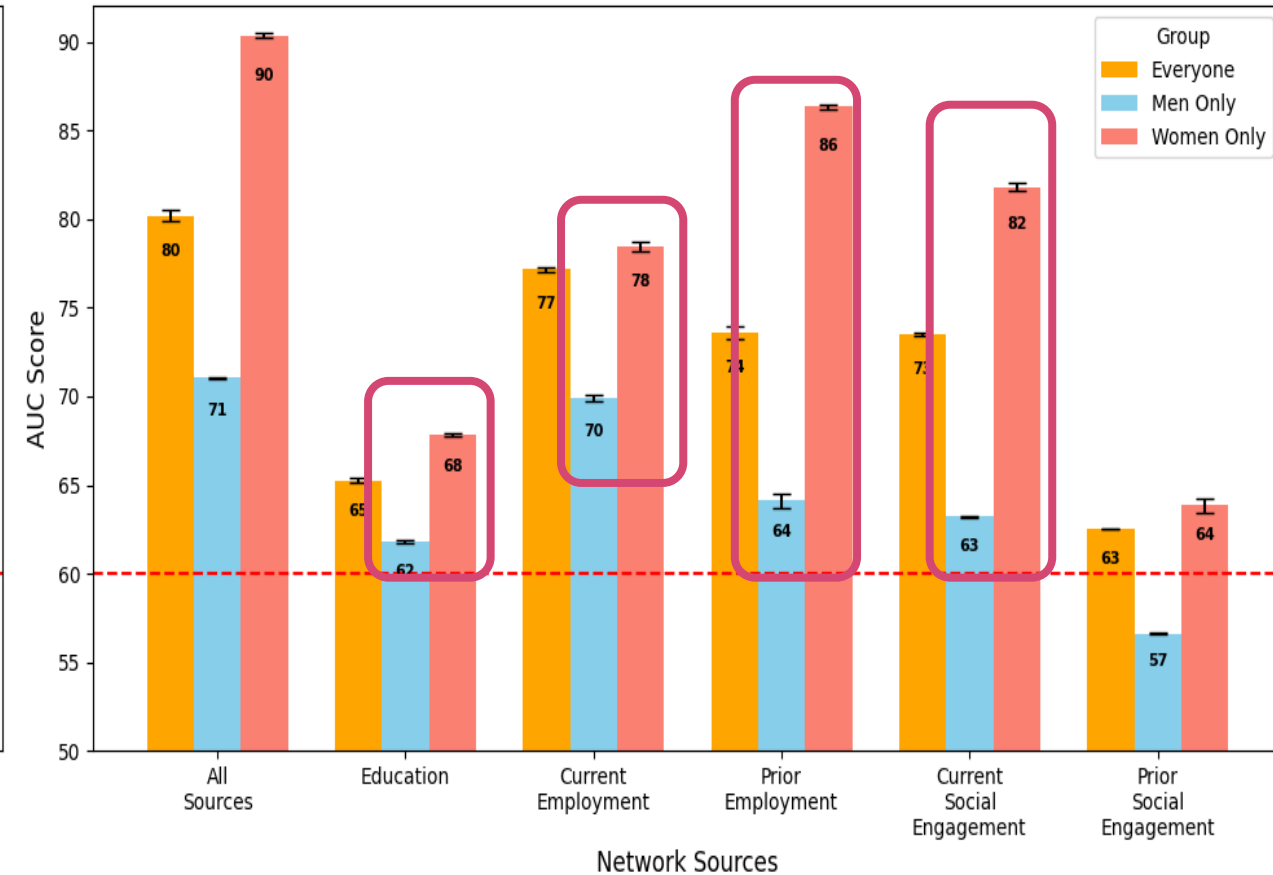# Results (Network Centrality)

Results
(Gender-based Personalized PageRank)

Network Source AUC by Gender (Matched Sample & Propage Energy from Male Directors)

Network Source AUC by Gender (Matched Sample & Propage Energy from Female Directors)

Key Takeaways

➢ **Networking is crucial for director appointments**, highlighting its importance in career advancement to board positions across genders.

➢ Despite similar career trajectories and backgrounds, **female face higher expectations in networking**, highlighting the need for broader engagement to overcome professional barriers.

➢ **Education ties and professional networks are key for all**, demonstrating their influential roles in reaching board-level positions.

➢ **Females' board success is also amplified by active social engagement**, highlighting the necessity to balance extensive social activities with other networking efforts to address gender-specific barriers.

➢ For females, **direct personal ties with incumbent board members (especially other female directors)** and their **role as network bridges** are crucial, emphasizing the importance of strategic networking to overcome gender barriers.

Thank you!

Q&A

With thanks to