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WHO FOUNDS PUBLIC FIRMS? THE INFLUENCE OF FOUNDER GENDER, HUMAN CAPITAL, AND SOCIAL CAPITAL ON THE LIKELIHOOD OF IPO

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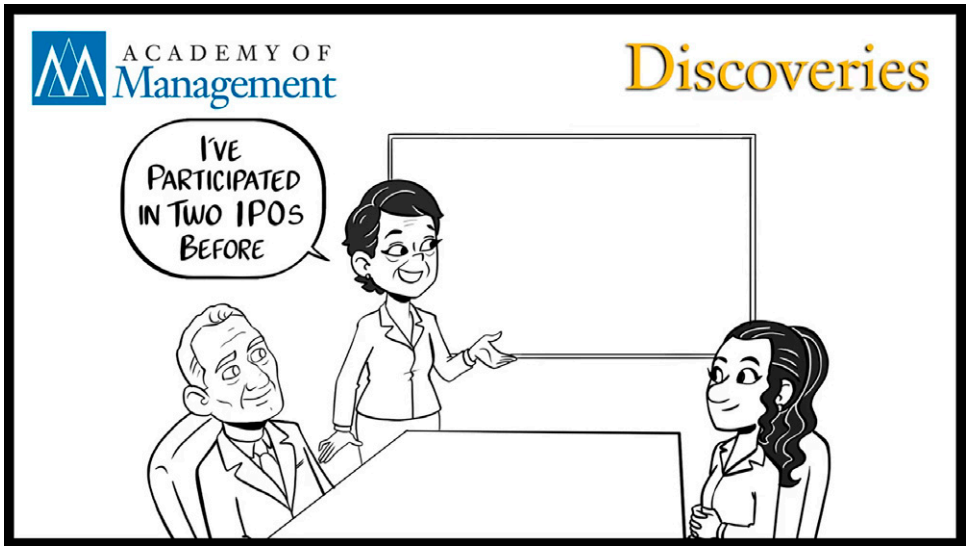

Initial public offerings (IPOs) are an important mechanism for firms to raise capital and founders and investors to realize a return on their investments. Little is known about the people who create these firms, as much of the existing research on entrepreneurs and IPOs has examined firm performance after the event. Given that founders shape a firm's trajectory, the lack of scholarly knowledge about who takes firms public indicates a theoretical and empirical conundrum. We examine the relationship between a founding team's gender composition, backgrounds, and the likelihood that the venture will complete an IPO by conducting an event history analysis of U.S. genomics firms founded between 1983 and 2018, followed through 2022. We discover that, while stereotypes and biases have been shown to influence venture funding, female-founded firms are equally likely to go public as other firms. Additionally, female founders and male founders exhibit similar professional and educational backgrounds, but these factors influence firm outcomes much differently. These results suggest female entrepreneurs and male entrepreneurs utilize human and social capital distinctly. Our findings indicate that female entrepreneurs in highly incongruous roles and settings can leverage their knowledge and skills, with exceptional consequences.

An initial public offering (IPO) is a significant achievement for any company. An IPO, or "going public," is the first offering to sell equity (shares) of a privately held firm to public investors, raising funds for the company while allowing shareholders to liquidate their holdings and realize a gain on their investments. IPOs are one of the most attractive fundraising mechanisms for startups not only for the potential capital they can provide, but also because they literally represent a firm's value and can indicate legitimacy and strategic growth potential (Cohen & Dean, 2005; Jain & Kini, 1999; Shepherd & Zacharakis, 2001). In 2023, over 100 firms completed an IPO, or

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went public, raising almost $19 billion[1] (Renaissance Capital, 2024). At the end of 2023, the 5,704 firms listed on the two largest stock exchanges, the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations (NASDAQ), had a combined market capitalization[2] of almost $50 trillion (Statista, 2024). Public firms represent a substantial and important economic engine, making IPOs an essential and relevant empirical context for management researchers and practitioners alike.

The strength of a founding team is essential for a venture's success, but remarkably little work has examined profiles of those who create firms that go public or the relationship between founders and the occurrence of IPOs. Entrepreneurs shape their firms as they create, organize, and grow the ventures, and their legacies can last for a considerable amount of time, even after they leave (Feeser & Willard, 1990; Stinchcombe, 1965; see also Marquis & Tilcsik, 2013, for a review). Founders' past experiences and expertise indicate their ability to draw upon related knowledge and exploit market opportunities (e.g., Cooper, Gimeno-Gascon & Woo, 1994; Marvel, Davis & Sproul, 2016; Unger, Rauch, Frese & Rosenbusch, 2011), improving their ability to organize and direct the company through an IPO and beyond. Thus, it follows that founders influence the likelihood that a firm will go public and that related human capital will prove beneficial to IPO prospects.

A small stream of research has shown that, indeed, the backgrounds of founders influence whether a firm goes public, although the findings are mixed. Some studies have shown that founding teams with startup experience are more likely to take their firms public (Beckman, Burton & O'Reilly, 2007), while others have shown that startup experience is not significant (Gompers, Kovner, Lerner & Scharfstein, 2010), with managerial and advanced technical education instead increasing the probability of an IPO or acquisition (Piazza, Reese & Chung, 2023). Prior executive experience (Beckman et al., 2007) or previous involvement in taking a company public (Gompers et al., 2010) are similarly associated with going public. Other aspects of founder human capital such as industry or other relevant work experience have not been examined. Thus, the relationship between founding teams' human and social capital and going public remains unclear.

Recent work has shown that gender can affect how a founder experiences their career, education, and entrepreneurial journey (e.g., BarNir, 2012; Cerqueti, Lucarelli, Marinelli & Micozzi, 2020; Woolley, 2019). We became intrigued by the possibility that gender may be an important factor in explaining the relationship between founders' backgrounds and IPOs. Gender heterogeneity introduces a diversity of perspectives that can bring unique and underrepresented insights into a team (Post & Byron, 2015); however, very few studies have examined the relationship between founder gender and IPO completion. Work that has integrated gender into the examination of IPOs has primarily approached the topic by looking at the effect of having women on boards of directors or top management teams (TMTs). Three studies found no relationship between entrepreneurs' gender and the probability that a firm went public or was acquired (Brush & Elam, 2024; Guzman & Kacperczyk, 2019; Piazza et al., 2023). However, these studies group IPOs with other types of exits such as acquisitions, which makes comparison difficult. We have not identified any studies that have integrated both the entrepreneurs' human or social capital and gender together in their assessment of IPO completion. Thus, our inquiry focuses on whether gender influences the relationship between founders' characteristics and IPO completions.

As there is little theory to guide our study of this phenomenon, we used an abductive approach to examine these research questions. We compiled a database of genomics firms started between 1983 and 2018 and followed their activity through 2022. We integrated information on each founding team member's entrepreneurial human capital, including their IPO, industry, and functional work experience, as well as education. We discover that founders' work experience and education can indeed influence the likelihood that a firm goes public, but in unexpected ways, and that not all human capital is beneficial. These results contribute to work on entrepreneurial human and social capital by challenging the view that related capital is generally beneficial for entrepreneurial performance and success (see Crook, Todd, Combs, Woehr & Ketchen, 2011; Marvel et al., 2016; Pahnke, Sirmon, Rhymer & Campbell, 2023; Unger et al., 2011). Our findings, and our lack thereof in some circumstances, provide a foundation for further exploration in light of conflicting results from existing studies.

Our discoveries extend the human capital perspective by integrating a much-needed empirical consideration of gender (e.g., Burt, 1998; Shaw, Marlow, Lam & Carter, 2009; Tinkler, Whittington, Ku & Davies, 2015). Adding gender to the consideration of entrepreneurial capital provides a more comprehensive treatment of founding team characteristics. In line with previous work, we find that the founding team's gender composition alone does not have a significant influence on IPOs. However, the relationships between the founding team's human and social capitals and IPO propensity varies considerably by gender.

[1] These figures do not include special-purpose acquisition companies (SPACs) or direct listings.

[2] "Market capitalization" is the total value of a firm's outstanding shares.

For example, while it is beneficial for teams to have male founders with IPO experience, the effect for teams including women with IPO experience is almost twice as large. Also, having a woman with industry experience on the founding team is singularly beneficial for IPO prospects. Conversely, female founders do not benefit from social capital the same way men do, indicating that women may remain excluded from entrepreneurial networks, particularly in high-technology settings (Murray & Graham, 2007; Ozkazanc-Pan & Clark Muntean, 2018). While social capital may be important for female entrepreneurs (Tinkler et al., 2015), the benefits thereof may be difficult to obtain. These discoveries suggest that, while the career paths and education of female and male entrepreneurs may be similar, they influence the outcomes of new ventures quite differently, indicating the need for a gendered perspective of human and social capital.

Our findings also build on work that dispels the myth that female entrepreneurs underperform compared to their male counterparts (e.g., Brush & Elam, 2024). Gender role incongruity research has focused the negative outcomes for women who undertake roles for which norms and expectations find their participation incongruous (e.g., Eagly & Karau, 2002; Heilman, 2001; Heilman, Wallen, Fuchs & Tamkins, 2004; Rudman & Phelan, 2008; Lee & Huang, 2018). Female founders of high-technology firms defy norms because both entrepreneurship and technologies sectors are considered masculine (Eddleston, Lang, Mitteness & Balachandra, 2016; Gupta, Turban, Wasti & Sikdar, 2009; Marlow & McAdam, 2012; Stephan & El-Ganainy, 2007). However, our study shows that female entrepreneurs are able to apply previous work experience with IPOs or in the industry, both considered incongruous, to the benefit of future companies. We contend that women in highly incongruous roles and settings may be able to benefit from a heightened regard for their experiences and skills.

By empirically exploring the specific relationships therein, we advance the dialogue on how female and male entrepreneurs may experience their professional careers differently (Woolley, 2019) and how being distinct can be an advantage. Together, these findings emphasize the importance of moving away from approaches that homogenize categories of entrepreneurs. Instead, research is needed that pays closer attention to the different ways individuals live through and apply their human and social capital, recognizing the heterogeneous nature of the entrepreneurial experience by gender.

BACKGROUND

An IPO is when a privately owned firm offers for sale shares of equity in the company to external investors on a stock exchange. When a firm undergoes an IPO, it transitions from a privately held company with a small group of investors, such as founders, angel investors and venture capitalists (VCs), into a publicly traded company with dispersed ownership (Certo, 2003; Chemmanur & Fulghieri, 1999). IPOs mark an important milestone for nascent firms, enhancing their legitimacy (Cohen & Dean, 2005; Shepherd & Zacharakis, 2001) and facilitating their access to critical resources and expertise that support ongoing growth and development (Certo, 2003; Deeds, Decarolis & Coombs, 1997). With the capital raised through an IPO, firms can invest in research and development, expand their operations, repay debt, acquire firms, explore new markets, and the like. An IPO also provides an avenue for early-stage stakeholders, such as founders and investors, to realize a return on their investment (Beckman et al., 2007; Certo, Covin, Daily & Dalton, 2001; Freeman, 1999). VCs, for instance, divest their investments within a specific timeframe; more than 80% of VC funds have predetermined lifetimes of about 10 years (Gompers & Lerner, 2004). As a result, they may encourage their portfolio investments to pursue exit mechanisms such as IPOs.

Every year, hundreds of companies go public around the world. In the United States, 108 firms raised almost $19 billion in 2023, up from a 30-year low of $8 billion in 2022 (Renaissance Capital, 2024; Statista, 2023). Over 5,700 firms are listed on the two largest stock exchanges, NYSE and NASDAQ, which provide investors with the ability to purchase shares in their companies. Such investments are important for institutional investors such as mutual funds, pension funds, and endowments, as well as individual investors. Public firms on NYSE and NASDAQ had a combined market capitalization of almost $50 trillion at the end of 2023, a 25% increase over the total market capitalization at the end of 2022 (Statista, 2024). Public firms employ about a quarter of the nongovernmental workforce in the United States (Carroll, 2021) and about 30% worldwide (Schlingemann & Stulz, 2022). As such, public firms play a crucial role in the world's economy across many industries.

Who Starts Public Firms?[3]

"Founders" are "people who create the firm, irrespective of whether they hold executive titles" (Beckman & Burton, 2008: 5). Research on founders has shown that they have a profound and ongoing

[3] We note that there is a substantial body of literature on IPOs more broadly. We focus primarily on studies related to influences on IPO probability. For a review of the influences on IPO performance, please see Cirillo et al. (2018).

influence in guiding an entrepreneurial firm's journey toward achieving an exit such acquisition, bankruptcy, or IPO. Founders shape their firms' initial strategy, structure, and processes, which influences future development (Baron, Burton & Hannan, 1999; Boeker, 1989). Moreover, entrepreneurial success is often credited to founders (Nelson, 2003) because they contribute to the development of resources and the accumulation of new knowledge and skills necessary for the continued growth of firms (Unger et al., 2011). This is particularly relevant in the case of nascent high-technology firms that rely on founders' knowledge and skills (Cooper & Bruno, 1977).

The human capital perspective argues that founders with related experience and education positively influence nascent firm outcomes because they are able to use industry and market relevant knowledge and skills to exploit entrepreneurial opportunities (e.g., Cooper et al., 1994; Marvel et al., 2016; Unger et al., 2011). Firms that go public tend to grow quickly, which requires industry, technical, and business knowledge, and the presence of founders at IPO acts as a signal of value to investors (Nelson, 2003). Research finds that certain aspects of founders' human capital are beneficial for completing an IPO, but the findings are mixed, as summarized in Table 1. For instance, some studies find that founders' entrepreneurial experience increases the likelihood of going public compared to other ventures (Beckman et al., 2007), whereas others show that it is not merely having entrepreneurial experience, but, rather, possessing a track record of successful IPOs that enhanced the likelihood of the firm completing an IPO (Gompers et al., 2010). Piazza and colleagues (2023) compared entrepreneurial experience to other forms of human capital and found that managerial experience and advanced technical degrees were the most influential factors in predicting the occurrence of acquisitions or IPOs (as a successful exit), while entrepreneurial experience and MBAs were not significant. Executive experience is positively associated with IPOs as well (Beckman et al., 2007). It follows that founders with highly relevant work experience with IPOs or as executives increase their new venture's IPO propensity. Likewise, in highly technical fields, such as science, technology, engineering, and math (STEM)-related industries, higher education in a related field would be an asset that increases the likelihood of an IPO (Piazza et al., 2023). Recent work has also shown that founders' human capital may not be associated with the occurrence of IPOs, but it can accelerate a firm's success in conjunction with a particular configuration of financial, social, technological, and commercial resources (Pahnke et al., 2023).

Social capital factors such as the networks that a firm has with stakeholders or alliance partners also act as a signal of quality as firms with better connections are able to achieve higher performance (e.g., Certo, Holcomb & Holmes, 2009). Firms having relationships with prominent stakeholders go public more quickly than other firms (Stuart, Hoang & Hybels, 1999). For example, links to VCs are beneficial because they contribute their skills, experience, and social networks to support the ability of investees to acquire valuable resources, hire talent, streamline operations, and devise new strategies (Gompers & Lerner, 2004; Leiblein & Reuer, 2004; Ragozzino & Blevins, 2016). In general, firms that go public may be founded by people with broad executive experience, industry domain expertise, or relationships with VCs.

Founders' Gender and IPOs

Between 2013 and 2021, over 2,000 firms went public in the United States yet only 25 were led by a female CEO-founder, with seven of these occurring in 2021 alone (Female Founders Fund, 2022; Shontell, 2021). Work has shown that there is an overall lack of female CEO-founders and executives taking firms public (Frii, O'nions, Sofla & Stålnacke, 2023). This is surprising, given that about a third of firms in Europe and the United States are founded by women (Jancewicz, 2014; Morelix, Fairlie & Tareque, 2017). These statistics made us wonder about the women who start firms that go public and how their characteristics compare to those of their male counterparts. Research has highlighted how gender can influence the experience of a founder's career and human capital (BarNir, 2012; Cerqueti et al., 2020; Woolley, 2019). We became intrigued by the possibility that a founder's gender may be a factor in explaining the influence of human capital on IPOs. Research on female founders continues to grow, improving our understanding of the effects of gender on firm outcomes (e.g., Brush, Greene, Balachandra & Davis, 2018; Woolley, 2019). However, compared to other individual characteristics and experiences recognized as important for firm growth, "gender is rarely considered in these investigations" (Hechavarria, Bullough, Brush & Edelman, 2019: 6; see also Brush & Elam, 2024; Link & Strong, 2016; Marvel et al., 2016).

The human capital perspective posits that education and work experience influence the ability of founders to obtain resources; however, it is largely silent on how gender influences this relationship. Literature on team heterogeneity indicates that having a variety of human capital benefits firm performance (e.g., Beckman et al., 2007; Ensley & Hmieleski, 2005; Ruef, Aldrich & Carter, 2003). Gender adds a dimension of diversity that can widen the perspectives available to an organization, including unique and underrepresented market insights (Post & Byron, 2015). However, founder

TABLE 1
Summary of Research on IPO Completion

	Beckman et al. (2007)	Gompers et al. (2010)	Piazza et al. (2023)	Brush and Elam (2024)	Guzman and Kacperczyk (2019)
Sample[a]	161 high-tech firms in Silicon Valley	8,753 entrepreneurs from 3,796 firms in Venture Source database 1986–2000	4,190 U.S. ventures founded 2011–2017 listed on Crunchbase, mainly CA, IL, MA, NY, or TX	278 VC-funded firms; matched set female and male founders	1,875,087 firms founded 1995–2011 in CA and MA
Measures	Proportion of founding team	Founder level, binary measures	Proportion of founding team	CEO level, binary measures	CEO or president, binary measures
Dependent variable	IPO	IPO	IPO or acquisition	IPO or acquisition	IPO or acquisition within six years
Independence variables:					
IPO experience	NI	+	NI	NI	NI
Entrepreneurial experience	+	0	0	NI	NI
Executive experience	+	NI	NI	NI	NI
Managerial experience	NI	NI	+	NI	NI
Advanced technical degree	NI	NI	+	NI	NI
MBA holders	NI	NI	0	NI	NI
Education prestige	NI	NI	NI	0	NI
Gender composition	NI	NI	0	0	0

Notes: NI = not included; + indicates a positive influence on the dependent variable; 0 indicates no influence on the dependent variable.
[a]U.S. state abbreviations: CA, California; IL, Illinois; MA, Massachusetts; NY, New York; TX, Texas.

gender diversity has not been shown to influence firm performance (Chowdhury, 2005; Hoogendoorn, Oosterbeek & van Praag, 2013).

Three studies have included gender in their examination of firms going public. Piazza and colleagues (2023) found that the proportion of women on a founding team alone does not influence the likelihood that a firm goes public or is acquired. However, in their sample of over 4,000 firms, only seven went public, indicating that their findings were driven by the 183 acquisitions that were coupled with IPOs to create a measure of exit success. Other related research also has found no difference in the likelihood that women and men entrepreneurs complete an IPO (Brush & Elam, 2024; Guzman & Kacperczyk, 2019). Nevertheless, this work has several challenges. First, these studies look at founders and CEOs, not the founding team alone. Second, IPOs are combined with another exit type, acquisitions, to create a measure of successful exits. While acquisition is certainly an outcome of interest, they are distinct from IPOs because acquisitions can be an indication of positive performance (e.g., high revenue or innovation) or negative results (e.g., asset sales and acquisition of firms in distress). IPOs, on the other hand, signal a positive trajectory and potential growth (Cohen & Dean, 2005; Jain & Kini, 1999; Shepherd & Zacharakis, 2001). The motivations for IPOs and acquisitions differ (Poulsen & Stegemoller, 2008). IPOs are often driven by the desire for growth through research and development and acquisitions, whereas acquisitions emphasize payouts and synergy. Third, Guzman and Kacperczyk (2019) measure IPOs or acquisitions within six years of founding. This may unnecessarily truncate the window of opportunity for an IPO because the average time between firm founding and IPO is about nine years (Ritter, 2024). Finally, both Brush and Elam (2024) and Guzman and Kacperczyk (2019) study IPOs and acquisitions in light of receiving external funds and do not include non-VC-backed firms.

Beyond IPO prospects, research has examined the influence of gender on IPO performance such as valuation, underpricing, and abnormal returns, indicating a challenge for women leading high-growth firms (see Cirillo, Mussolino, Saggese & Sarto, 2018). Female founders or CEOs leading firms going public are considered less capable than their male counterparts (Bigelow, Lundmark, McLean Parks & Wuebker, 2014; Lee & Huang, 2018). Firms led by female CEOs that went public on NASDAQ between 2000 and 2021 had lower pre- and post-IPO firm valuation than other firms (Lubberink, 2023). Some work has found that firms led by female CEOs have greater IPO underpricing than those led by male CEOs (Liu, Park & Velamuri, 2024), though other studies have found no difference in underpricing (Mohan & Chen, 2004). Interestingly, some firms hire women onto the TMT before registering for an IPO to signal diversity in the top ranks (Kenney & Patton, 2015; Kenney, Patton & Terjesen, 2024). However, adding female founders to a firm just before registering for an IPO would be disingenuous and may garner unwanted scrutiny.

The disadvantage experienced by female founders or CEOs with regards to IPOs is mainly ascribed to role incongruity or perceived mismatch between female stereotypes and the personal qualities traditionally associated with firm founders and TMTs (Huang, Joshi, Wakslak & Wu, 2021; Liu et al., 2024). Investors tend to perceive female entrepreneurs and executives as lacking the skills and human capital necessary for successful ventures (Kanze, Huang, Conley & Higgins, 2018). As such, investors may not support a woman-led firm's decision to go public, opting instead to support an acquisition exit strategy, thus lessening the likelihood that a female-founded firm will take the IPO route.

The relationship between gender, founder characteristics, and IPOs may be related to the initial support, or lack thereof, that female entrepreneurs receive. Research has shown that women receive less VC than men (Brush et al., 2018; Guzman & Kacperczyk, 2019; Woolley, 2019). Moreover, women often face challenges in fundraising due to stereotypes and role incongruency such that investors perceive a mismatch between women and entrepreneurship (Kanze et al., 2018; Malmström, Johansson & Wincent, 2017). This is particularly the case in high-technology fields, which, like entrepreneurship, is considered a masculine endeavor (Eagly & Karau, 2002; Eddleston et al., 2016; Gupta et al., 2009; Marlow & McAdam, 2012). Between 2012 and 2022, the amount of VC funding provided to firms started by women has ranged from 11% to 19% per year in the United States; however, before 2012, the amount was consistently less than 10% each year (Pitchbook, 2026). Founders who have been on the receiving end of negative stereotypes and bias in previous funding rounds (Alsos, Isaksen & Ljunggren, 2006) may be discouraged from approaching other investors only to be subject to similar treatment, the result of which may be fewer female-founded public firms. As VC is correlated with IPOs (e.g., Honjo & Nagaoka, 2018), it follows that female entrepreneurs would be less likely to take their firms public due to initial resource constraints. However, even controlling for VC, founders' human capital may be shown to be relevant. For example, Woolley (2019) found that the human capital of founders influenced their firms' outcomes in different ways depending on their gender. For example, firms founded by men with executive work experience were more likely to suffer a bankruptcy or asset sale than other firms, while firms were more likely to be acquired if they

were started by a male serial entrepreneur. These relationships did not hold for female entrepreneurs who were less likely to experience an acquisition if they held a doctoral degree (Woolley, 2019). Extrapolating these findings, it is likely that the industry experience, employment background, and education of founders will influence a firm in different ways depending on the founders' genders.

Summary

How founders' gender, human capital, and social capital influence a firm's IPO completion has not been adequately addressed by current theories such as human capital, role congruency, or team heterogeneity. Given the role that skills and knowledge play in entrepreneurial firm success, and the fact that IPOs are considered a successful exit for firms, it follows that higher levels of human capital would increase the likelihood that a firm would go public. Human capital most directly related to IPOs should include experience with IPOs, previous entrepreneurial experience, or higher education in the field of a firm's operations. Social capital, particularly in terms of relationships with resource providers such as VC firms, has been shown to increase firms' IPO chances, but the unbalanced relationship between female entrepreneurs and funding may challenge this benefit. With these expectations, we turn to our empirical examination of the backgrounds of female and male entrepreneurs and the likelihood that the firms they create go public.

METHODS

To address our research questions, we selected the genomics sector of biotechnology firms in the United States. Genomics is particularly salient for the study of high-growth entrepreneurship because it has fairly recent commercial origins. As an integral part of scientific discoveries in biotechnology, medicine, and environmental science (Jain & Huang, 2022), genomics tends to have a stronger IPO prevalence than other industries (Ritter, 2022), making it a highly appropriate setting to study IPOs. About 11% of firms listed on the NYSE and NASDAQ are biotechnology firms. Of those, almost a fifth are genomics firms with an estimated market capitalization of nearly $1 trillion. The global genomics market is expected to surpass $100 billion by 2030 (e.g., Grand View Research, 2024; Precedence Statistics, 2023; Straits Research, 2023). The field of genomics has proven useful for recent management studies about entrepreneurship and regulations (Gao & McDonald, 2022), worker mobility (Jain & Huang, 2022), and intellectual property appropriation (Geiger & Gross, 2021; Gray, Briscoe & Ferraro, 2023; Huang, 2017).

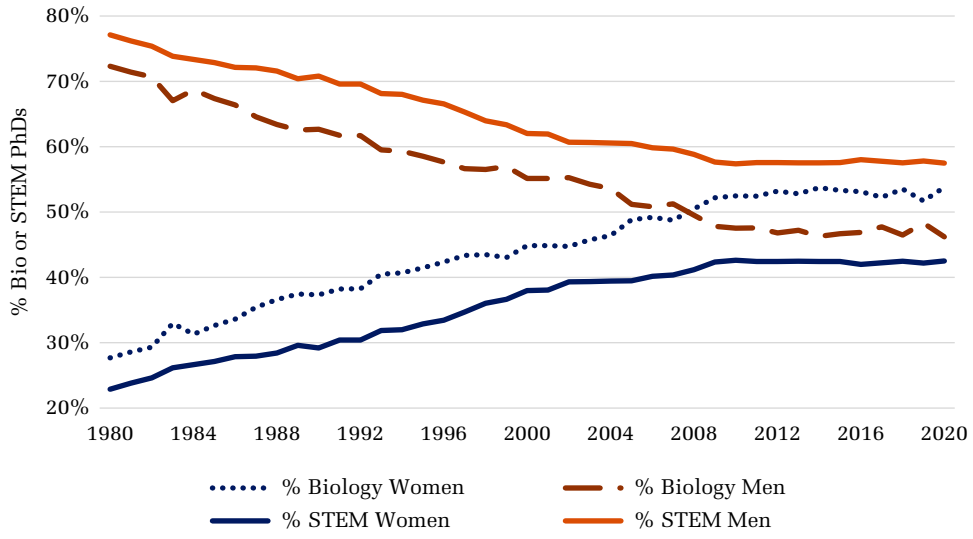
"Genomics" is the study of a complete set of genetic information of an organism.[4] In 1977, Frederick Sanger was the first person to sequence (determine the composition of) a genome. This method was commercialized in 1986 through a license with Applied Biosystems. In 1983, a second technique, polymerase chain reaction sequencing, was invented by Kary Mullis at Cetus Corporation. Thus, 1983 is a logical starting point for studying the commercial developments of genomics as it represents the year of the earliest relevant startup activity. Beginning our study in 1983 ensures that the data are not "left-censored," wherein the origins of an event occur before the opening of the observation window (Blossfeld & Rohwer, 2002; Yamaguchi, 1991).

Genomics is a highly scientific, deeply technologically advanced field requiring extensive training and education and often advanced degrees such as PhDs, which are considered a pipeline for entrepreneurship in the field. Figure 1 shows the percentage of doctorates awarded in STEM-related fields (solid lines) as well as the specialty biology (dashed and dotted lines) by gender. In the 1980s, between 20% and 30% of STEM doctorates were earned by women, while a higher percentage, between 25% and 40%, of biology doctorates were earned by women. Over time, these percentages have increased. In 2008, biology doctorate awards reached parity between women and men. These figures parallel the subspecialties of genetics and genomics. In fact, in 2000, 57.3% of genetics and genomics doctorates were awarded to women, compared to 53.8% of biology doctorates awarded to women (NCSES, 2021). While not reaching parity, the percentage of STEM-related doctorates awarded to women has increased from 22.9%, in 1980, to 42.5% in 2020. These figures indicate the growing participation of women in STEM and biotechnology fields, which provides the foundation for genomics-related entrepreneurship. Specifically, the pipeline of educated workers has been fairly even across genders throughout the past 15 years, with women representing a substantial portion of doctorates before that.

We compiled a database of all genomics companies started in the United States before 2018 with data from many sources, including patents, government grants, industry lists, scientific publications, university websites, VC listings, directories, press releases,

[4] In contrast, genetics is the study of the function and composition of a single gene. The human genome is comprised of about 20,000 coding genes and over 17,000 non-coding genes. Coding genes provide instructions on how to create proteins while non-coding genes have other functional roles.

FIGURE 1
Percentage of STEM and Biology Doctoral Degrees Awarded by Year and Gender



Note: Data compiled from the National Science Foundation's 2022 "Survey of Earned Doctorates" (see NCSES, 2021, for data tables).

and articles.[5] The commercial and research activity of each firm was triangulated and analyzed. To be included in the study, over 50% of a firm's activity, such as products, patents, R&D, or sales, had to be related to genomics. The firm must also be for-profit and independent. This classification process parallels previous studies that used this technique to identify nascent technology firms (e.g., Schoonhoven, Eisenhardt & Lyman, 1990; Woolley, 2016). In total, 619 firms were identified. Due to a lack of reliable data, eight firms were dropped from the database, resulting in a final sample of 611 firms.

Data and Variables

This study focuses on the dependent variable of achieving an IPO on a U.S. centralized stock exchange such as the NYSE or NASDAQ. The Securities and Exchange Commission records and provides information on all IPOs listed in the United States. For each firm, data were gathered on whether the firm filed and completed an IPO and the year of its first public offering (through 2022). We calculated the time between the firm's founding and IPO in years (as appropriate).

For the 611 firms, 1,137 founders were identified. As we are interested in the human capital of the founding team, our analysis is at the firm level. Our primary research question centered on how the inclusion of different types of human capital may influence an IPO. Thus, we looked to see if the founders contributed a particular type of experience or education to the team. Thus, demographic, work experience, and education data were gathered for each founder. Data sources included curriculum vitae, resumes, executive biographies, firm websites, university websites, LinkedIn profiles, and Crunchbase entrepreneur profiles. Data were triangulated across multiple data sources to ensure reliability.

Each person's work history was analyzed, and several separate dichotomous variables were constructed for several functional positions (serial entrepreneur, non-entrepreneur C-level and senior vice president-level executive (non-founder), manager, professor, or doctor (MD)). We determined whether the founder was involved in an IPO at their previous employment as a founder or executive (i.e., the company went public while the person was in this role at the firm) by examining company announcements, press releases, resumes, and employment histories.

As an entrepreneur's industry experience in related fields may influence the development and trajectory of their firms (see Josefy, Harrison, Sirmon & Carnes, 2017, for a review), we measured work experience in biotechnology organizations. Dichotomous variables were constructed for education in terms of doctorate (PhD) or master of business administration (MBA) degrees. Since an affiliation with prestigious

[5] Sources include the United States Patent and Trademark Office (USPTO), Small Business Innovation Research (SBIR.gov), Crunchbase, MedicalStartups (medicalstartups.org), BioSpace, Golden, the Associated Press (AP News), and the Biotechnology Innovation Organization (bio.org).

universities is tied to higher IPO valuations (Colombo, Meoli & Vismara, 2019), where relevant, we also accounted for the influence of a founder's advanced degree (most recent education) awarded by one of the top 10 VC-backed universities as rated by PitchBook (2022) in terms of the amount of VC raised by graduates in the last decade. Gender was determined using name and pronoun analysis in profiles and articles about the founders.

Two sets of covariates were calculated for each founding team: proportion of the founding team with the human capital characteristics described and binary variables signifying whether at least one person on the team had any of the aforementioned work or educational experience.[6] We include both the proportion of the founding team with the characteristic and the dichotomous measure of the existence of a person with the characteristic in the founding team to determine if the inclusion of certain types of human capital influences the dependent variable by their presence, particularly as the proportion of founders categorized by both gender and human capital can become small given the sample size.

The models include several firm- and macro-level controls. As the year that the firm was founded can influence outcomes (Singh, Tucker & House, 1986), we control for the founding year. We also control for the resources that the firm acquired, such as obtaining VC (e.g., Beckman et al., 2007; Guzman & Kacperczyk, 2019; Honjo & Nagaoka, 2018) or government SBIR or STTR grant funding (e.g., Fini, Perkmann, Kenney & Maki, 2023), before the IPO or by the end of 2021. Models also include the number of founders (Beckman et al., 2007; Piazza et al., 2023) and the count of patents granted to the firm (Guzman & Kacperczyk, 2019; Pahnke et al., 2023) through 2021. Macro-level controls include the number of firms that close each year in the United States, the number of genomics firms in existence each year, and the square to control for density dependence (Carroll & Hannan, 1989; Hannan & Freeman, 1988). To account for environmental munificence around the biotechnology field more broadly, we control for the number of IPOs launched in the year.[7] All environmental control variables were standardized and lagged one year to provide time for the macro-level condition to have an effect.

Analysis

As we assessed not only the occurrence of an IPO, but also the length of time from the firm's founding to the IPO event, we employed the event history analysis technique using Stata with maximum likelihood estimation and robust standard errors. Given that the hazard rates in these data did not remain constant over time, the Weibull distribution was selected as the preferred model (see Box-Steffensmeier & Jones, 1997). We verified the fit of the distribution by comparing the Akaike information criteria of the model using different distributions, which confirmed that the Weibull distribution best fit the data (Blossfeld & Rohwer, 2002). The equation for the Weibull distribution (Allison, 2014) is:

$$\log h(t) = b_0 + b_1x_1 + b_2x_2 + c \log t$$

where h(t) is the hazard function; b_0, b_1, b_2, and c are constants to be estimated; and t signifies time. Hazard ratios were estimated such that values over 1 indicate an increase in the likelihood that the covariate influenced the dependent variable, and values under 1 indicate a lower likelihood of influence by the covariate. The influence of covariates is calculated as $100 \times$ (hazard ratio $-$ 1), or the percent change in the hazard for a one-unit increase in the covariate (Allison, 2014). Analyses were run stepwise, with each type of human capital in separate models.

FINDINGS

The female founders and male founders of genomics firms have similar work and educational backgrounds, with a few exceptions as shown in Table 2, which Figure 2 depicts visually. About 5% of both female and male founders have experience taking a firm public before starting the firms analyzed here. Over 30% of all founders have biotechnology industry experience, most of which was related to genetics. Male founders have more industry, entrepreneurial, and executive experience compared to female founders. About the same percentages of female and male founders were previously managers or professors; however, more female founders were research scientists compared to male founders, proportionally.

[6] The analysis shown here is at the firm level. We performed a robustness check in which we modeled founder-level data controlling for firm fixed effects. The results were analogous to those shown here.

[7] As a robustness check, we controlled for the number of biotechnology IPOs per year and the percentage of IPOs from the biotechnology industry. These were not used in the final analysis as both are highly correlated with the density of the genomics field. To capture the effects of both density and macro-level IPO activity, we selected these controls. As another robustness check, we controlled for the percentage of STEM doctorates awarded to women in the year of firm founding. Findings were analogous, but the control was highly correlated to other variables so the models were not included.

TABLE 2
Summary of Individual Genomics Founder Characteristics by Gender

	All	*n* = 1,137	Female founders	*n* = 137	Male founders	*n* = 999
IPO experience	5.4%	61	5.1%	7	5.4%	54
Industry experience	38.8%	442	32.6%	45	39.7%	397
Serial entrepreneur	20.7%	236	10.1%	14	22.2%	222
Executive	31.3%	356	13.8%	19	33.7%	337
Manager	19.7%	224	23.2%	32	19.2%	192
Professor	28.9%	329	27.5%	38	29.1%	291
Scientist	24.3%	277	37.0%	51	22.6%	226
Doctor	16.5%	188	10.1%	14	17.4%	174
PhD	67.2%	764	68.8%	95	67.0%	669
MBA	10.1%	115	11.6%	16	9.9%	99
Elite VC education	24.2%	275	25.4%	35	24.0%	240

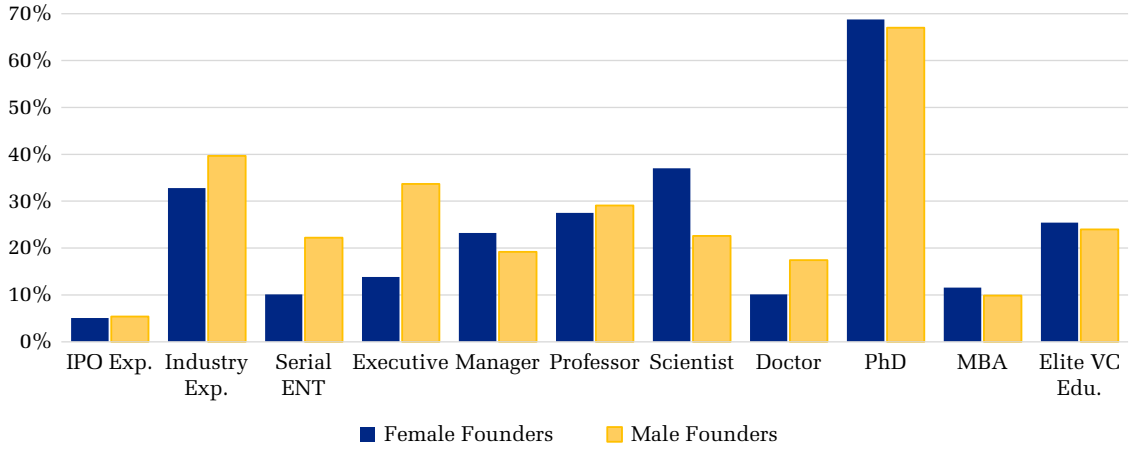
A higher percentage of men than women were doctors (17.4% vs. 10.1%, respectively). Finally, female founders and male founders are similarly educated across doctorate, MBA, and elite educational levels. All of the founders' doctoral degrees awarded in this sample were in fields related to genomics such as neurology, pharmaceutics, molecular genetics, and biochemistry.

In the sample of genomics firms analyzed here, 124 firms, or 20% of our sample, completed an IPO by the end of 2022, with the average time between founding and IPO of 7.4 years. Breaking down the frequency of IPOs by the gender of the founding team members, we find little difference in the proportion that completed an IPO: 21% for firms with only men on the founding teams, 16% for women-only teams, and 28% for mixed-gender teams.

Table 3 provides the summary statistics and Table 4 shows the correlation matrix of the core variables (the full correlation matrix is available in Appendix A, Table A1). Tables 5 through 8 show the results of the event history analysis with Tables 5 and 6 including the covariates for the *proportion of the founding team* with the characteristics described, while Tables 7 and 8 include covariates for the founding team having *at least one person* with the characteristic. The first model in Table 5 includes the control variables. We find that firms obtaining VC funding are more likely to go public than other firms, but government innovation grants have the opposite effect, reducing the IPO likelihood by about 40%. Furthermore, firms with more founders are about 30% less likely to IPO. The more patents that a firm is awarded, the less likely it is to go public, but only by about 2%. In Models 7 and 18, we assess the overall effect of the founding team's gender composition on a firm's likelihood of going public. Neither the higher proportion of female founders nor the existence of a female founder influences an IPO, in line with previous research (Piazza et al., 2023). In other words, firms with female entrepreneurs are not at a disadvantage in taking their firms public.

We next examine aspects of entrepreneurial human capital, including firm founders' IPO experience,

FIGURE 2
Percentage of Founders with Work Experiences and Education by Gender



Note: Edu. = education, ENT = entrepreneur, Exp. = experience.

TABLE 3
Summary Statistics

Variable	Mean	*SD*	Min.	Max.
IPO by 2022	0.20	0.40	0	1
Firm received VC	0.59	0.49	0	1
Firm received SBIR/STTR[a] grant	0.46	0.50	0	1
Count of founders	1.86	1.11	1	8
Number of patents	3.98	9.82	0	91
U.S. firm closures (K)	376.22	94.79	28	453
Genomics firm density	605.96	178.68	362	770
IPO activity	239.87	107.73	21	677
Team proportion IPO experience	0.05	0.18	0	1
Team proportion industry experience	0.41	0.44	0	1
Team proportion serial entrepreneur	0.21	0.35	0	1
Team proportion executive	0.32	0.41	0	1
Team proportion manager	0.21	0.35	0	1
Team proportion professor	0.26	0.38	0	1
Team proportion scientist	0.22	0.42	0	1
Team proportion doctor	0.17	0.33	0	1
Team proportion PhD	0.65	0.42	0	1
Team proportion MBA	0.11	0.26	0	1
Team proportion elite VC education	0.21	0.34	0	1
Team proportion woman	0.12	0.27	0	1
Team proportion woman IPO experience	0.01	0.05	0	1
Team proportion man IPO experience	0.05	0.18	0	1
Team proportion woman industry experience	0.04	0.15	0	1
Team proportion man industry experience	0.38	0.43	0	1
Team proportion female serial entrepreneur	0.01	0.08	0	1
Team proportion male serial entrepreneur	0.20	0.34	0	1
Team proportion female executive	0.02	0.10	0	1
Team proportion male executive	0.31	0.40	0	1
Team proportion female manager	0.03	0.14	0	1
Team proportion male manager	0.19	0.34	0	1
Team proportion female professor	0.04	0.16	0	1
Team proportion male professor	0.22	0.35	0	1
Team proportion female scientist	0.05	0.23	0	1
Team proportion male scientist	0.20	0.40	0	1
Team proportion female doctor	0.01	0.09	0	1
Team proportion male doctor	0.16	0.32	0	1
Team proportion woman–PhD	0.08	0.23	0	1
Team proportion man–PhD	0.57	0.43	0	1
Team proportion woman–MBA	0.02	0.11	0	1
Team proportion man–MBA	0.09	0.24	0	1
Team proportion woman–elite VC education	0.02	0.12	0	1
Team proportion man–elite VC education	0.19	0.32	0	1

[a]Grant funding programs: SBIR = Small Business Innovation Research, STTR = Small Business Technology Transfer.

industry experience, functional work experience, and educational background. We commence by examining the overall impact of firm founders' previous IPO experience, as shown in Models 2 and 8 (proportion of team members) and Models 13 and 19 (at least one team member). Model 2 illustrates that firms with higher proportions of IPO experience in the founding team are up to almost two and a half times more likely to go public than other firms. Model 13 shows that, when any member of the founding team has IPO experience, a firm is almost four times more likely to go public than other firms with founders lacking such IPO experience.

Model 8 includes the proportion of the founding team that are women or men with experience taking a firm public, and shows that ventures with higher proportions of female founders with IPO experience are almost 10 times more likely to take their ventures public and firms with higher proportions of male founders with IPO experience are over twice as likely compared to other firms. Analogously, firms with any female founder with IPO experience are over six times more likely to take their firms public and those with any male founder with IPO experience are almost four times more likely compared to other firms (see Model 19). Notably, the impact of women's IPO experience

TABLE 4
Correlation Matrix

Variable		1	2	3	4	5	6	7	8	9	10	11	12
1	Team proportion IPO experience	1.00											
2	Team proportion industry experience	.22	1.00										
3	Team proportion serial entrepreneur	.33	.36	1.00									
4	Team proportion executive	.28	.38	.73	1.00								
5	Team proportion manager	−.08	.16	−.28	−.37	1.00							
6	Team proportion professor	−.01	−.33	−.09	−.23	−.20	1.00						
7	Team proportion scientist	−.09	.03	−.22	−.26	.04	−.36	1.00					
8	Team proportion doctor	−.02	−.07	.01	−.03	−.03	.21	−.08	1.00				
9	Team proportion PhD	.01	−.03	.01	−.12	−.04	.23	.03	−.21	1.00			
10	Team proportion MBA	.05	.08	.02	.08	.13	−.16	−.06	−.07	−.22	1.00		
11	Team proportion elite VC education	.09	−.01	.05	.02	−.06	.17	−.01	.17	.22	−.07	1.00	
12	Team proportion woman	−.04	−.09	−.13	−.17	.00	.08	.01	−.06	.05	.04	−.02	1.00
13	Team proportion woman IPO experience	.26	.06	.10	.07	−.05	.02	−.04	−.01	.07	−.03	.03	.16
14	Team proportion man IPO experience	.96	.21	.31	.27	−.07	−.02	−.08	−.02	−.01	.06	.09	−.09
15	Team proportion woman industry experience	.04	.24	.01	−.03	.07	−.09	.05	−.04	−.03	.02	−.07	.52
16	Team proportion man industry experience	.21	.94	.37	.40	.14	−.30	.01	−.06	−.02	.07	.02	−.28
17	Team proportion female serial entrepreneur	.14	.10	.19	.13	−.06	−.02	−.07	−.03	.00	−.02	.00	.27
18	Team proportion male serial entrepreneur	.30	.35	.97	.71	−.27	−.09	−.21	.02	.00	.03	.05	−.20
19	Team proportion female executive	.10	.05	.14	.17	−.08	−.04	−.08	−.05	.00	.02	−.01	.33
20	Team proportion male executive	.26	.37	.71	.97	−.36	−.23	−.24	−.02	−.12	.07	.03	−.25
21	Team proportion female manager	−.04	.04	−.09	−.11	.30	−.07	.00	−.04	−.02	.14	−.05	.46
22	Team proportion male manager	−.07	.15	−.25	−.34	.92	−.18	.05	−.02	−.04	.08	−.04	−.19
23	Team proportion female professor	−.03	−.16	−.10	−.14	−.09	.36	−.12	.05	.09	−.08	.05	.55
24	Team proportion male professor	.00	−.28	−.05	−.18	−.17	.91	−.33	.20	.20	−.13	.16	−.16
25	Team proportion female scientist	−.04	.01	−.11	−.13	.03	−.07	.27	−.09	.06	−.04	.05	.37
26	Team proportion male scientist	−.10	.00	−.21	−.25	.02	−.32	.89	−.05	.04	−.05	−.04	−.10
27	Team proportion female doctor	−.04	−.03	−.05	−.07	−.02	.11	−.04	.23	−.03	−.05	.07	.31
28	Team proportion male doctor	−.01	−.06	.03	−.01	−.03	.18	−.07	.96	−.21	−.06	.15	−.15
29	Team proportion woman–PhD	.00	−.12	−.12	−.16	−.02	.13	.01	−.07	.23	−.03	.01	.81
30	Team proportion man–PhD	.01	.03	.07	−.03	−.03	.15	.03	−.17	.86	−.20	.21	−.38
31	Team proportion woman–MBA	−.04	−.02	−.05	−.04	.13	−.07	−.05	−.07	−.06	.40	−.06	.36
32	Team proportion man–MBA	.07	.09	.05	.10	.09	−.14	−.04	−.04	−.21	.91	−.05	−.13
33	Team proportion woman–elite VC education	.01	−.08	−.05	−.08	−.02	.12	.03	.05	.08	−.04	.32	.39
34	Team proportion man–elite VC education	.10	.02	.07	.05	−.05	.13	−.02	.16	.20	−.06	.94	−.16

Variable		13	14	15	16	17	18	19	20	21	22	23
13	Team proportion woman IPO experience	1.00										
14	Team proportion man IPO experience	−.02	1.00									
15	Team proportion woman industry experience	.31	−.05	1.00								
16	Team proportion man industry experience	−.05	.24	−.12	1.00							
17	Team proportion female serial entrepreneur	.60	−.03	.49	−.07	1.00						
18	Team proportion male serial entrepreneur	−.04	.32	−.11	.39	−.05	1.00					
19	Team proportion female executive	.48	−.03	.39	−.09	.80	−.05	1.00				
20	Team proportion male executive	−.05	.28	−.13	.43	−.07	.74	−.08	1.00			
21	Team proportion female manager	−.02	−.04	.41	−.11	−.01	−.09	−.02	−.11	1.00		
22	Team proportion male manager	−.05	−.06	−.09	.19	−.06	−.24	−.07	−.33	−.10	1.00	
23	Team proportion female professor	.03	−.04	.00	−.17	.00	−.11	−.01	−.14	.05	−.11	1.00
24	Team proportion male professor	.01	.00	−.09	−.25	−.02	−.05	−.04	−.18	−.09	−.14	−.07
25	Team proportion female scientist	−.02	−.03	.27	−.09	−.03	−.10	−.04	−.12	.14	−.03	−.05
26	Team proportion male scientist	−.03	−.09	−.05	.02	−.05	−.20	−.07	−.24	−.05	.05	−.05
27	Team proportion female doctor	−.01	−.04	.14	−.09	−.02	−.05	−.02	−.06	.14	−.07	.37
28	Team proportion male doctor	.00	−.01	−.08	−.03	−.02	.04	−.04	.00	−.08	.00	−.06
29	Team proportion woman–PhD	.20	−.06	.32	−.24	.19	−.17	.23	−.22	.32	−.15	.58
30	Team proportion man–PhD	−.04	.02	−.20	.10	−.10	.09	−.12	.00	−.18	.04	−.22
31	Team proportion woman–MBA	−.01	−.04	.19	−.08	.05	−.06	.17	−.08	.47	−.06	−.03
32	Team proportion man–MBA	−.03	.08	−.06	.12	−.04	.06	−.05	.12	−.06	.12	−.07
33	Team proportion woman–elite VC education	.08	−.02	.06	−.11	.06	−.07	.04	−.09	.11	−.07	.40
34	Team proportion man–elite VC education	.00	.10	−.09	.06	−.02	.08	−.02	.06	−.09	−.02	−.10

TABLE 4
(Continued)

	Variable	24	25	26	27	28	29	30	31	32	33	34
24	Team proportion male professor	1.00										
25	Team proportion female scientist	−.05	1.00									
26	Team proportion male scientist	−.32	.00	1.00								
27	Team proportion female doctor	−.04	.02	−.03	1.00							
28	Team proportion male doctor	.22	−.10	−.04	−.04	1.00						
29	Team proportion woman–PhD	−.12	.31	−.06	.18	−.12	1.00					
30	Team proportion man–PhD	.26	−.11	.07	−.13	−.14	−.30	1.00				
31	Team proportion woman–MBA	−.06	.02	−.06	−.02	−.06	.16	−.14	1.00			
32	Team proportion man–MBA	−.12	−.05	−.03	−.04	−.03	−.11	−.15	−.03	1.00		
33	Team proportion woman–elite VC education	−.05	.23	−.06	.39	−.06	.38	−.13	.02	−.05	1.00	
34	Team proportion man–elite VC education	.19	−.03	−.02	−.07	.19	−.13	.27	−.07	−.04	−.02	1.00

TABLE 5
EHA Results for the Influence of Founding Team Human Capital (*Proportions*) on IPO: Models 1–6

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Team proportion IPO experience		2.548**				
		(0.92)				
Team proportion industry experience			0.893			
			(0.19)			
Team proportion serial entrepreneur				1.367		
				(0.56)		
Team proportion executive				0.284***		
				(0.11)		
Team proportion managerial experience				0.286***		
				(0.09)		
Team proportion professor				0.264***		
				(0.09)		
Team proportion scientist				4.449**		
				(0.14)		
Team proportion doctor				1.575†		
				(0.43)		
Team proportion PhD					0.787	
					(0.18)	
Team proportion MBA					0.842	
					(0.32)	
Team proportion elite VC education						1.868*
						(0.46)
Firm received VC	1.611*	1.707*	1.653*	1.759*	1.561*	1.582*
	(0.34)	(0.37)	(0.36)	(0.40)	(0.34)	(0.34)
Firm received government grant	0.570*	0.605*	0.571*	0.565*	0.585*	0.545**
	(0.13)	(0.14)	(0.13)	(0.13)	(0.14)	(0.13)
Founder count	0.656***	0.663***	0.654***	0.748**	0.666***	0.660***
	(0.06)	(0.07)	(0.06)	(0.07)	(0.07)	(0.06)
Patent count	0.976*	0.975*	0.975*	0.973*	0.978*	0.974*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Genomics firm density	0.213*	0.202*	0.202*	0.125**	0.196*	0.223*
	(0.15)	(0.14)	(0.14)	(0.09)	(0.14)	(0.15)
Genomics firm density^2	4.436*	4.717*	4.55*	6.647**	4.775*	4.297*
	(2.88)	(3.05)	(2.97)	(4.60)	(3.13)	(2.78)
Firm closures	0.212***	0.223***	0.215***	0.220***	0.215***	0.216***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
IPO activity	1.669***	1.663***	1.634***	1.524***	1.656***	1.677***
	(0.20)	(0.20)	(0.21)	(0.19)	(0.20)	(0.20)
χ^2	556.87	560.07	554.07	518.80	558.00	553.76
Log likelihood	−320.57	−317.62	−320.42	−305.80	−320.00	−317.46

Notes: n = 611. Time at risk: 6,233 firm-years.
†$p < .10$
*$p < .05$
**$p < .01$
***$p < .001$

TABLE 6
EHA Results for the Influence of Founding Team Human Capital and Gender (*Proportions*) on IPO: Models 7–12

Variable	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Team proportion woman	0.579					
	(0.24)					
Team proportion woman × Team proportion IPO experience		9.988*				
		(10.30)				
Team proportion man × Team proportion IPO experience		2.220*				
		(0.85)				
Team proportion woman × Team proportion industry experience			0.985			
			(0.60)			
Team proportion man × Team proportion industry experience			0.887			
			(0.19)			
Team proportion female serial entrepreneur				0.776		
				(1.27)		
Team proportion male serial entrepreneur				1.456		
				(0.62)		
Team proportion female executive				0.319		
				(0.46)		
Team proportion male executive				0.299**		
				(0.11)		
Team proportion female manager				0.067*		
				(0.08)		
Team proportion male manager				0.326***		
				(0.11)		
Team proportion female professor				0.291		
				(0.23)		
Team proportion male professor				0.276***		
				(0.10)		
Team proportion female scientist				1.535		
				(0.73)		
Team proportion male scientist				0.431**		
				(0.14)		
Team proportion female doctor				9.219†		
				(11.00)		
Team proportion male doctor				1.526		
				(0.43)		
Team proportion woman–PhD					0.457	
					(0.27)	
Team proportion man–PhD					0.821	
					(0.19)	
Team proportion woman–MBA					0.547	
					(0.60)	
Team proportion man–MBA					0.866	
					(0.34)	
Team proportion woman–elite VC education						0.765
						(0.69)
Team proportion man–elite VC education						1.995**
						(0.50)
Firm received VC	1.601*	1.674*	1.655*	1.715*	1.549*	1.562*
	(0.34)	(0.36)	(0.36)	(0.39)	(0.33)	(0.34)
Firm received government grant	0.579*	0.576*	0.570*	0.578*	.590*	0.552*
	(0.13)	(0.14)	(0.13)	(0.14)	(0.14)	(0.13)
Founder count	0.660***	0.666***	0.655***	0.725**	0.670***	0.667***
	(0.06)	(0.07)	(0.06)	(0.08)	(0.07)	(0.07)
Patent count	0.976*	0.975*	0.975*	0.977*	0.979*	0.976*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Genomics firm density	0.208*	0.210*	0.202*	0.119**	0.197*	0.224*
	(0.14)	(0.15)	(0.14)	(0.09)	(0.14)	(0.15)
Genomics firm density^2	4.480*	4.610*	4.550*	7.001**	4.723*	4.274*
	(2.90)	(3.01)	(2.97)	(4.93)	(3.09)	(2.76)
Firm closures	0.208***	0.217***	0.215***	0.204***	0.212***	0.212***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)

TABLE 6
(Continued)

Variable	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
IPO activity	1.672***	1.686***	1.633***	1.59***	1.656***	1.689***
	(0.20)	(0.21)	(0.21)	(0.20)	(0.20)	(0.21)
χ^2	555.25	556.16	554.22	512.30	557.60	554.08
Log likelihood	−319.61	−316.84	−320.41	−303.20	−319.30	−316.81

Notes: $n = 611$. Time at risk: 6,233 firm-years.
$^{+}p < .10$
$^{*}p < .05$
$^{**}p < .01$
$^{***}p < .001$

is substantially larger than for their male counterparts, indicating that women greatly benefit from careers involving taking a firm public and successfully transferring that knowledge to their next ventures.

Founding teams' industry experience is considered in Models 3, 9, 14, and 20, with Models 9 and 20 including gender. As shown in Models 3 and 14, the overall impact of firm founders' industry experience is not statistically significant, suggesting that founders may not need work experience in related industries to take their firms public. Nonetheless, Model 20 shows that having women on the team with careers in relevant industries doubles the IPO likelihood. By contrast, the coefficient of male founders' industry experience is positive but not statistically significant. These findings suggest that female founders who have cultivated their work expertise in a similar industry may enjoy an advantage when it comes to taking their own firms public.

Models 4, 10, 15, and 21 consider the founders' prior functional work experience, including their previous roles as entrepreneurs, executives, managers, professors, research scientists, and doctors. Higher proportions of founding team members who are executives, managers, professors, or research scientists, or even the presence of anyone from these categories, decreases the IPO likelihood (see Models 4 and 15), while having doctors on the team increases the incidence of IPOs. Models 10 and 21 indicate that gender plays a role in these results. IPO prospects are reduced for teams with higher proportions of male executives, female or male managers, and male professors or scientists. This is also supported when considering the existence of female managers and male professors on the team. Teams with doctors are also more IPO prone.

Next, we consider the influence of the founders' education in Models 5, 11, 16, and 22. Two sets of education are considered: doctorates, directly tied to the technical aspects of the industry, and MBAs, which are associated with the business side of running a growth-oriented company. Models 5 and 16 indicate that the founding team's education did not significantly influence IPOs. Model 21 shows that teams with a female founder–PhD were less likely to complete an IPO.

Lastly, we examine the influence of having a founding team member who graduated from one of the top 10 VC-backed universities in Models 6, 12, 17, and 23. Models 6 and 17 show that firms are almost twice as likely to complete IPOs when the founding team has higher proportions or even one person on the founding team with an advanced degree from a top VC-backed university. However, Models 12 and 23 show that this relationship is true only for male founders. Teams with male founders associated with top VC-backed universities are twice as likely to take their firms public compared to teams without such ties. The coefficient for the proportion of female founders with elite educational backgrounds is not statistically significant, and the existence of a female founder with an elite education negatively impacts IPO prospects, although that is marginally significant. This suggests that female founders may not derive similar benefits as their male counterparts from the social capital affiliated with these universities.

DISCUSSION

In this study, we explore questions about who starts firms that go public and how founding teams' gender composition, in light of human and social capital, may influence a firm's IPO propensity. Using the setting of genomics entrepreneurship in the United States, we find that having women on the founding team does not significantly influence IPO likelihood. These findings build on previous work dispelling the myth of the female disadvantage in entrepreneurship (e.g., Brush & Elam, 2024; Guzman & Kacperczyk, 2019; Piazza et al., 2023). However, the effects of the founding team's human and social capital vary profoundly by gender. In the following, we consider the theoretical implications of these findings, boundary

TABLE 7
EHA Results for the Influence of Founding Team Human Capital and Gender (*Any Inclusion*) on IPO: Models 13–17

Variable	Model 13	Model 14	Model 15	Model 16	Model 17
Team IPO experience	3.860***				
	(1.05)				
Team industry experience		1.229			
		(0.24)			
Team serial entrepreneur			0.686†		
			(0.16)		
Team executive			0.551*		
			(0.15)		
Team managerial experience			0.488**		
			(0.12)		
Team professor			0.342***		
			(0.09)		
Team scientist			0.538*		
			(0.17)		
Team doctor			1.801**		
			(0.38)		
Team PhD				0.737	
				(0.15)	
Team MBA				0.812	
				(0.22)	
Team with elite VC education					1.966***
					(0.40)
Firm received VC	1.754**	1.536*	1.561†	1.518*	1.622*
	(0.38)	(0.33)	(0.36)	(0.33)	(0.36)
Firm received government grant	0.630	0.562*	0.593*	0.589*	0.531**
	(0.15)	(0.13)	(0.14)	(0.14)	(0.12)
Founder count	0.625***	0.651***	0.914	0.705**	0.605***
	(0.06)	(0.06)	(0.12)	(0.08)	(0.06)
Patent count	0.976*	0.977*	0.975*	0.979*	0.970**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Genomics firm density	0.198*	0.229*	0.159*	0.194*	0.209*
	(0.14)	(0.16)	(0.12)	(0.14)	(0.14)
Genomics firm density^2	4.732*	4.310*	5.459*	4.891*	4.577*
	(3.07)	(2.79)	(3.77)	(3.23)	(2.98)
Firm closures	0.226***	0.206***	0.212***	0.212***	0.220***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
IPO activity	1.684***	1.733***	1.649***	1.692***	1.641***
	(0.20)	(0.22)	(0.22)	(0.21)	(0.20)
χ^2	551.87	559.87	535.00	561.30	544.19
Log likelihood	−309.57	−320.01	−308.90	−319.40	−315.07

Notes: n = 611. Time at risk: 6,233 firm-years.
†$p < .10$
*$p < .05$
**$p < .01$
***$p < .001$

conditions, and multiple opportunities for further research.

Human and Social Capital

To examine the influence of founder gender on IPOs, we start with a baseline consideration of human and social capital, which are largely deemed beneficial for entrepreneurial performance and success (see Crook et al., 2011; Marvel et al., 2016; Pahnke et al., 2023; Unger et al., 2011). We find that not only is the value of distinct types of human and social capital unequal, but also that some distinctly do not contribute to certain performance outcomes—in our case, IPOs. This discovery calls into question the prevailing assumptions about the benefits of human capital. For example, we show that the influence of human capital is not always positive and that some may be detrimental to the performance measure being evaluated. While this aligns with some previous work, (e.g., Beckman et al., 2007), theory regarding the negative aspects of human capital is underdeveloped (Ray, Essman, Nyberg, Ployhart & Hale, 2023). Perhaps more importantly, considering gender highlights the

TABLE 8
EHA Results for the Influence of Founding Team Human Capital and Gender (*Any Inclusion*) on IPO: Models 18–23

Variable	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23
Team with woman	0.684					
	(0.20)					
Team woman with IPO experience		6.517**				
		(4.27)				
Team man with IPO experience		3.845***				
		(1.09)				
Team woman with industry experience			2.083*			
			(0.73)			
Team man with industry experience			1.294			
			(0.25)			
Team with female serial entrepreneur				1.061		
				(0.60)		
Team with male serial entrepreneur				0.746		
				(0.20)		
Team with female executive				1.076		
				(1.15)		
Team with male executive				1.254		
				(0.42)		
Team with female manager				0.080***		
				(0.06)		
Team with male manager				0.681		
				(0.17)		
Team with female professor				1.053		
				(0.51)		
Team with male professor				0.504*		
				(0.14)		
Team with female scientist				2.421†		
				(1.17)		
Team with male scientist				0.64		
				(0.20)		
Team with female doctor				2.67		
				(1.75)		
Team with male doctor				1.605*		
				(0.36)		
Team woman–PhD					0.367*	
					(0.15)	
Team man–PhD					0.577	
					(0.44)	
Team woman–MBA					0.730	
					(0.15)	
Team man–MBA					0.827	
					(0.23)	
Team woman–elite VC education						0.353†
						(0.22)
Team man–elite VC education						2.58***
						(0.52)
Firm received VC	1.548*	1.762**	1.536*	1.185	1.368	1.361
	(0.33)	(0.38)	(0.33)	(0.27)	(0.30)	(0.31)
Firm received government grant	0.584*	0.612*	0.550*	0.675	0.626*	0.563*
	(0.14)	(0.15)	(0.13)	(0.17)	(0.15)	(0.13)
Founder count	0.677***	0.618***	0.630***	0.831	0.755*	0.646***
	(0.07)	(0.06)	(0.06)	(0.11)	(0.08)	(0.07)
Patent count	0.979*	0.977*	0.978*	1.002	0.989	0.988
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Genomics firm density	0.215*	0.205*	0.225*	0.213*	0.192*	0.209*
	(0.15)	(0.14)	(0.15)	(0.16)	(0.14)	(0.15)
Genomics firm density^2	4.362*	4.596*	4.405*	4.228*	4.835*	4.380*
	(2.83)	(3.01)	(2.84)	(3.05)	(3.19)	(2.88)
Firm closures	0.207***	0.222***	0.204***	0.163***	0.201***	0.192***
	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)

TABLE 8
(Continued)

Variable	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23
IPO activity	1.683***	1.709***	1.759***	1.951***	1.733***	1.757***
	(0.20)	(0.21)	(0.22)	(0.27)	(0.22)	(0.22)
χ^2	556.68	548.75	557.29	543.00	559.70	538.15
log likelihood	−319.70	−308.00	−317.85	−301.00	−316.20	−307.30

Notes: $n = 611$. Time at risk: 6,233 firm-years.
$^{+}p < .10$
$^{*}p < .05$
$^{**}p < .01$
$^{***}p < .001$

complexities of human capital value and suggests that our understanding of human and social capital effects needs to be revised and reconsidered. Current work treats the role of human capital in firm outcomes as uniform for all genders. The discovery that human and social capital benefits vary depending on gender casts doubt on the assumption that these forms of entrepreneurial capital are universally valuable.

As IPO experience is the most relevant element of human capital for firms going public, it is not surprising that a founding team's IPO experience would increase the likelihood that a venture goes public. However, the magnitude of the relationship when broken down by gender is intriguing. We discover that firms with female founders who have IPO experience were significantly more likely to undergo IPO than other firms. One could argue that any gender difference is due to the supply side challenge; overall, there are fewer women with IPO experience. However, in our sample, the founders are similar in terms of human capital—such as IPO experience as an executive, a related doctoral degree, or an MBA—across genders. We find that not only does familiarity with the IPO process as an executive increase the likelihood of an IPO for all entrepreneurs, but also that female founders benefit more from having previous IPO experience than male founders do, even though a similar proportion have such experience (5.1% vs. 5.4%, respectively). Our results highlight that, although historically, women have not been involved in IPOs to the same extent as men, female entrepreneurs are better able to leverage this experience to the benefit of future firms. This finding suggests that female founders derive more substantial benefits from IPO experience than their male counterparts, which is not fully accounted for by human capital theories. It may be that women with IPO experience are more inclined to repeat this event than men with similar work backgrounds. The drive that enabled these female entrepreneurs to take a previous company public may increase the likelihood that they continue this path. Indeed, all the women with IPO experience who subsequently took their next venture public were serial entrepreneurs in this sample. Women who combine IPO experience with an entrepreneurial background may have a more well-rounded skill set or motivations to take their next venture public. However, not all the male founders with IPO experience are serial entrepreneurs in this study, raising questions about the *additionality* of these skills, knowledge, and experiences. These findings suggest that it is not the role or title that is important, but the depth and quality of that experience—simply having human capital is not as valuable as what one does with it. Research based on the human capital perspective has yet to fully examine the employment, not the existence, of experience and skills, or how this may differ for women versus men. Likewise, research that more deeply assesses the impact of skills and knowledge combinations that founders bring into their new ventures could clarify the potential that additionality of human capital has different value for women compared to men.

We also find that firms with founding teams that include a woman with industry experience benefit in terms of a higher probability of IPO; however, this is not true for their male counterparts. This result is fascinating given that female entrepreneurs were less likely to have previous work experience in related industries compared to male founders (32.6% vs. 39.7%, respectively), suggesting that women are able to leverage industry experience into successful exits at future firms that they create. These results suggest that, while work has shown that a founding team's gender composition does not influence the probability that VC-backed firms successfully exit in terms of merger, acquisition, or IPO (Brush & Elam, 2024), focusing on IPOs alone indicates some benefit of this experience for women such that they are able to apply such experience to develop high-growth ventures more effectively.

In terms of other work experience, the results show that there are several layers of how the type of experience can impact IPOs and by whom. Overall, we

show that more managerial experience may not be beneficial, regardless of the founder's gender. This may be due to a lack of an entrepreneurial mindset at the managerial level. People who have managerial positions at incumbent firms may be less motivated by a startup culture that values high growth, which can be indicated by an IPO. More intriguing is our discovery that the proportion of male founders with executive work experience was higher compared to female founders (33.7% vs. 13.8%, respectively; see Figure 2); however, these men are *less* likely to take their firms public. This finding contrasts with the human capital perspective that contends that executive experience increases IPO prospects (Beckman et al., 2007). Female executives who found new ventures may develop mindsets that enable them to forge high-growth firms given their previous success in highly challenging roles. This reinforces our suggestion that future work is needed to advance a gendered perspective of human capital, enhancing our understanding of how it is developed and utilized.

Advanced education indicates skills and knowledge relevant to related business endeavors. While previous research has tended to treat advanced degrees the same, we distinguish between different types of advanced degrees (doctoral vs. business master's degrees), leading to distinct results. Given the highly technical nature of genomics, we expected that higher education in a related field would be an asset that would increase the likelihood of an IPO, as seen in previous research (Piazza et al., 2023). As mentioned, all the doctoral degrees in this sample were in fields related directly to genomics, increasing the salience of this training to the technology that the firms were building. Likewise, earning an advanced business education such as an MBA builds skills that are relevant to running high-growth firms. However, our results contradict previous findings and received wisdom—firms with founders who earned doctoral degrees or MBAs have the same likelihood of IPO as other firms, regardless of gender. Initially, we considered that this may be due to a high correlation between the type of degree and most recent work experience such as doctoral education and professorial work, which decreased IPO likelihood overall, or MBA and managerial work, which also decreased IPOs. However, this was not the case as both correlations are less than .23 (see Table 4). Research about the salience and value of knowledge directly related to a venture's core technology or product offering could provide insight into how human capital is utilized in long term venture performance. Given that our results largely contradict those of previous studies, education could be an interesting avenue for further research.

Another notable discovery is that female entrepreneurs do not benefit from social capital in the same ways that their male counterparts do. We find that men with advanced degrees from top VC-backed universities are over twice as likely to start firms that go public, while their female counterparts reap no advantage. This contrasts with Brush and Elam's (2024) findings that attending an elite university did not influence successful exits, though they defined elitism in terms of overall school prominence and not in terms of VC-backing history. It is plausible that their results indicate that attending a prominent school may not necessarily build the social capital needed for firm success, while social capital built by attending highly VC-backed schools may be more related to firm outcomes. Brush and Elam (2024) study only VC-funded firms, which should make the social capital associated with attending a highly VC-backed university more salient. By including both VC-funded and nonfunded firms and examining the highly relevant VC-backed university attendance, we examine the role of social capital more broadly. This prompts the question: Why do women from the top VC-backed universities not experience new venture development in the same way as men from these schools? The difference in the percentages of women and men in this sample who had advanced degrees from top VC-backed universities is insignificant (25.4% vs. 24.0%, respectively—see Table 2), indicating that the affiliation with the school itself is not the mechanism behind this result. VC investors tend to invest in startups from their alma mater, due to an increase in the amount of information that having shared educational backgrounds brings (Garfinkel, Mayer, Strebulaev & Yimfor, 2025). However, our results control for receiving VC. We posit that male entrepreneurs from these schools may be better able to exploit the schools' networks. Ozkazanc-Pan and Clark Muntean (2018) argue that social networks in technology fields remain normatively masculine and continue to exclude women from entrepreneurship (see also Schott & Cheraghi, 2015). Women also have been excluded from networking opportunities in scientific fields that can impact their prospects to commercialize their innovations (Murray & Graham, 2007), which may similarly impact their ability to build business networks that support high-growth firms. Perhaps women are similarly excluded from networking opportunities that would support technology entrepreneurship while in school. Interventions that address social capital building opportunities may be necessary to improve the support that potential female entrepreneurs receive and further encourage the development of innovative firms.

Another potential explanation is that the firms founded by women and men are qualitatively different in ways not captured by the data collection in this study. These unexplored differences may become

pronounced if the founder graduates from a top VC-backed university. Further research examining who benefits from VC-backed university affiliation could be an important development for theory building on the role of networks and interorganizational relationships for entrepreneurial outcomes.

The Potential Benefit of Role Incongruity

Our study also contributes to work on role congruity perspective, which argues that people who behave in ways congruent to their perceived gender are viewed favorably, while those who violate gender role expectations are stigmatized (e.g., Eagly & Karau, 2002; Heilman, 1983). Role incongruity and stereotypes are relevant as external factors influencing a firm's ability to IPO in so much as firm founders being able to gain support from investment banks that are needed to underwrite and facilitate the IPO process. Prior research has predominantly examined the challenges women face when they tackle roles for which norms and expectations find their participation incongruous. For example, women are evaluated less favorability when they display characteristics such as assertiveness or ambition that conflict with gender role expectations (e.g., Eagly & Karau, 2002; Rudman & Phelan, 2008), which can result in penalties for being successful (Heilman, 2001; Heilman et al., 2004). Indeed, female CEOs are considered less capable than their male counterparts (Kanze et al., 2018), including those taking their firms public (Bigelow et al., 2014; Lee & Huang, 2018), which can lead to lower valuations (Lubberink, 2023) or greater underpricing (Liu et al., 2024).

Female founders of high-technology firms are challenged not only because entrepreneurship is considered a masculine endeavor making their participation incongruous with career expectations (Eddleston et al., 2016; Gupta et al., 2009; Stephan & El-Ganainy, 2007), but also in terms of sector incongruity—technology sectors tend to be considered masculine and hostile toward women (Marlow & McAdam, 2012). In the setting of IPOs, role incongruity may be even more heightened due to the lack of female representation in IPOs more broadly (Female Founders Fund, 2022; Frii et al., 2023; Shontell, 2021). Thus, this intensified incongruity between gender and experience expectations may enhance the salience of a female founder's skills and knowledge.

Our work challenges the foundations of the role congruity perspective by establishing that female entrepreneurs are not systematically disadvantaged in IPOs, even though they occupy incongruous roles as founders of high-technology or high-science ventures. Female and male founders have comparable human and social capital (see Table 2), raising questions about how these are perceived across genders. If the extreme examples of role incongruency seen here heighten the salience of female founders' skills and knowledge, our findings suggest that these entrepreneurs may benefit from challenging expectations. Some stereotype violations by women, such as having higher independence or self-reliance, may be perceived as positive attributes for female leaders if they are also perceived as being more communal (Schaumberg & Flynn, 2017). Female leaders are rated more highly than their male counterparts when their exceptional performance surpasses societal expectations (Ma, Rosette & Koval, 2022; Rosette & Tost, 2010). As such, gender role incongruity along with strong credentials may increase the benefit of human capital alone. Given the overall lack of female CEO-founders and executives taking firms public (Frii et al., 2023), our findings may be an interesting twist to work showing that gender role incongruity disadvantages women in male-stereotypical roles and settings (see Marlow & McAdam, 2012). Female founders may be able to utilize the perceived incongruity of roles and settings, exploiting the distinctions to their benefit.

We further posit that our findings may be due to the women themselves—their experiences defying expectations in previous incongruous roles may prepare them to better handle similar challenges. While the low percentages of both female and male founders having IPO experience indicate that this experience cannot be taken for granted, there may be different expectations around gender such that women with such experience are considered exceptional or that their previous experience is more salient. Given their experience, these female founders have proven their capabilities and skills in dealing with high-stakes situations. Likewise, women with experience in roles deemed incongruous with their gender may have developed coping strategies to succeed in such settings to the benefit of their firms.

Additional support may be seen in our findings that founding teams with male professors are less likely to pursue an IPO, but not those with female professors even though the same percentage of founders were professors for all genders (just under 30%). Academic entrepreneurs tend to have lower growth intentions when founding firms (Clarysse, Andries, Boone & Roelandt, 2023), suggesting that professors would be less likely to aim for an IPO. Research has shown that women are more likely to start ventures with different goals than men, aspiring to achieve work–life balance and flexibility, which can slow or impede firm growth (Bird & Brush, 2002; Thébaud, 2015). Professorial careers tend to provide flexibility and work–life balance, which would be in line with the goals of female entrepreneurs. It follows that female

professors should be less likely to take on risky, high-growth ventures. Indeed, previous work has shown that female professors in STEM fields are less likely to found firms than their male counterparts (e.g., Ding & Choi, 2011; Murray & Graham, 2007; Rosa & Dawson, 2006; Stephan & El-Ganainy, 2007). However, we find that female professors are no less likely to found *high-growth firms* than other founders, suggesting that those female professors who are entrepreneurs defy expectations further. This finding also suggests that female entrepreneurs who have faced the challenges of role incongruency are able to leverage this experience. For example, female professors who become entrepreneurs may be less influenced by the stigma associated with the commercialization of science than men—a shift from Murray and Graham's (2007) findings that female professors are excluded from the opportunity to commercialize their innovations. Thus, this finding is intriguing and inspires further research.

Other Discoveries

Our study found other discoveries that are compelling in light of work on new venture performance, although they were considered control variables here. For example, we find that government innovation grants actually work against a company's likelihood of going public. This contrasts with recent work that finds that government grants have no impact on IPO prospects for digital-focused firms and a positive impact on non-digital firms (Fini et al., 2023). This also counters the argument that government subsidy programs support higher-quality firms (Dutta, Folta & Rodrigues, 2022), and that such funding improves firm funding and performance (e.g., Howell, 2017). Our findings indicate that government grants may support innovative firms, but not necessarily high-growth ventures, even if they are further funded by VC.

Our findings also contradict the idea that having more founders is better for a firm's performance. Larger teams are considered beneficial for new ventures due to their ability to access a wider range of resources and expertise (e.g., Beckman et al., 2007; Eisenhardt & Schoonhoven, 1990). Thus, we include the number of founders as a control, but find that having more founders decreases the IPO likelihood of the firm. We contend that there may be a curvilinear effect that we did not model that would indicate an optimum size of founding teams. It is likely that small teams lack the resources and connections to garner additional resources necessary for venture growth, but large teams may require coordination that can lead to inefficiencies or conflicts (Monaco, Meoli, Vanacker & Vismara, 2024). Thus, there may be an optimal founding team size that has been neglected in previous research.

Research has found that having patents improves a firm's potential for a positive exit (Guzman & Kacperczyk, 2019; Pahnke et al., 2023). Thus, we control for the number of patents awarded to the firm. Surprisingly, the results show that having more patents is associated with a lower IPO likelihood. The finding that more patents is not better may indicate that firms focused on innovation and R&D, evidenced by patents, may be neglecting the growth and scale necessary for an IPO. There may be a curvilinear relationship between patents and growth, which is supported by Acs and Sanders's (2012) argument that stronger patent protection at the policy level increases the incentive to conduct R&D leading to growth, but further strengthening of patent protection diminishes returns to entrepreneurship. The lack of clarity about the advantages and disadvantages of patents is worthy of further investigation.

Limitations, Generalizability, and Opportunities for Future Research

The setting of this study, the high-science technology field of genomics in the United States, is an advantage and disadvantage. Within this sample of genomics firms, a relatively high percentage went public (20%) compared to the average of less than 1% of the general population of firms (Davis, Haltiwanger, Jarmin & Miranda, 2006). This allows us to investigate our research questions in a setting in which the outcome of interest occurs in abundance. Our findings may be most generalizable to industries in which IPOs are more likely, such as telecommunications, media, pharmaceuticals, and life sciences (Statista, 2023). Likewise, the findings may be generalizable only to other STEM fields such as healthcare, or other areas of biotechnology in which advanced degrees are common, such as pharmaceuticals, genetics, and medicine. However, it is unclear if our results can apply to other industries. This indicates an opportunity for further research to examine the relationship between human capital, social capital, gender, and IPOs in industries with fewer IPOs or for non-STEM fields.

Our study observes the potentially strong influence of social capital in terms of an affiliation with the top VC-backed universities. This relationship may be heightened in other settings. For example, the conclusions drawn from our U.S. sample may not be universally applicable to other countries, as institutional and cultural factors in different contexts could alter the impact of a founding team's human capital and gender composition on firm IPO completion. For example, in countries where regulations strongly

influence the IPO process or shareholder control, the founding team's social capital in the form of business *guanxi* or a relational network may emerge as a pivotal influence on the likelihood of an IPO (Park & Luo, 2001; Xiong & Zhao, 2021), such that firms without such capital may not even consider going public because they lack the connections needed to facilitate the transaction. If serial entrepreneurship allows firm founders more time to build a broad and strong business network or *guanxi*, scholars may discover contrasting results in such settings as serial entrepreneurship may be more influential on IPO propensity. Similarly, should regulations increase (or decrease) the ability of shareholders to intervene in firm operations, the desirability of IPOs may decrease (or increase).

Moreover, our findings may not hold in settings where female founders face increased vulnerability to gender stereotypes or are perceived as less suitable for leadership roles by the public (Liu et al., 2024). We believe that contextual factors may be key mechanisms. Cross-cultural studies are needed to explore the relationship between a founding team's human capital, gender composition, and IPOs.

Firm founders are the initial architects of their firms' structure and strategy, pursuing a vision of what they want the firm to be and how they see it progressing. Their motivations and involvement in the firm may impact the decision to seek an exit through an IPO. We would expect, for example, that individuals who start a business to explore their intrinsic interest in technology development would be likely to differ from those motivated by the goal of commercial success and income replacement when considering exit strategies. Firm founders who exchange a portion of their ownership for capital may find themselves with diminished decision-making authority compared to those who retain full ownership. Additional empirical research, including in-depth case studies, is warranted to explore the relationship between firm founders' motivations and roles and the likelihood of an IPO.

CONCLUSION

In this study, we advance our collective understanding of the relationship among founding team members' gender, work experience, industrial background, and education and how these factors influence the likelihood that a firm will complete an IPO. The findings indicate that, even when women and men have similar work backgrounds and education, they experience those foundations differently, which may impact the outcomes of their firms. Given the centrality of these elements to work in entrepreneurship, this study can help provide a foundation for the development of a gendered perspective of human capital and IPOs. Likewise, programs and policies designed with the archetypal male entrepreneur in mind may hinder female entrepreneurs, preventing them from reaching their full potential. This suggests that we should pay closer attention to how individuals experience their human capital and better appreciate the complex and heterogeneous nature of entrepreneurship. By acknowledging the diversity of entrepreneurial journeys, we unlock opportunities for better support structures and a more inclusive ecosystem. Given the role of public firms in the world's economy, a better understanding of this phenomenon is warranted. In this study, we have attempted to lay a foundation for further work in this area. Many questions remain unanswered though, and there are several opportunities for an important and informative research stream to emerge.

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APPENDIX A
ADDITIONAL STATISTICAL INFORMATION

TABLE A1
Full Correlation Matrix

Variable		1	2	3	4	5	6	7	8	9	10	11
1	IPO by 2022	1.00										
2	Firm received VC	.21	1.00									
3	Firm received SBIR/STTR[a] grant	−.01	−.14	1.00								
4	Count of founders	.15	.21	−.04	1.00							
5	Number of patents	.10	.15	.13	−.03	1.00						
6	U.S. firm closures (K)	−.33	.22	−.20	.05	−.01	1.00					
7	Genomics firm density	−.42	.05	−.09	−.01	−.05	.52	1.00				
8	IPO activity	−.08	−.01	.05	−.01	−.02	.03	.69	1.00			
9	Team proportion IPO experience	.17	.07	−.17	.04	.05	.04	−.06	−.08	1.00		
10	Team proportion industry experience	.12	.03	−.08	−.09	.02	.00	.01	.02	.22	1.00	
11	Team proportion serial entrepreneur	.08	.05	−.05	.01	.06	.07	.02	.02	.33	.36	1.00
12	Team proportion executive	.13	.05	−.04	−.03	.10	.05	−.03	.00	.28	.38	.73
13	Team proportion manager	.00	.01	−.10	−.08	−.04	.00	.06	.07	−.08	.16	−.28
14	Team proportion professor	−.06	.00	.16	.15	−.07	.01	−.03	−.09	−.01	−.33	−.09
15	Team proportion scientist	−.05	−.04	.01	−.03	.01	−.04	.03	.03	−.09	.03	−.22
16	Team proportion doctor	.09	.05	−.03	−.03	−.02	−.06	−.06	−.02	−.02	−.07	.01
17	Team proportion PhD	−.03	−.01	.15	.09	.04	−.04	.03	.01	.01	−.03	.01
18	Team proportion MBA	.04	.06	−.09	−.04	.01	.04	.00	−.01	.05	.08	.02
19	Team proportion elite VC education	.13	.15	.05	.13	.06	.01	−.04	−.05	.09	−.01	.05
20	Team proportion woman	−.05	.00	−.04	.01	−.09	.04	.05	−.03	−.04	−.09	−.13
21	Team proportion woman IPO experience	.09	.04	.06	.07	−.02	−.07	−.06	−.04	.26	.06	.10
22	Team proportion man IPO experience	.15	.06	−.19	.02	.06	.06	−.05	−.07	.96	.21	.31
23	Team proportion woman industry experience	−.01	.00	.01	.03	−.05	−.01	.01	−.03	.04	.24	.01
24	Team proportion man industry experience	.12	.03	−.09	−.10	.04	.00	.01	.03	.21	.94	.37
25	Team proportion female serial entrepreneur	.03	.03	−.01	.03	−.03	−.01	−.07	−.06	.14	.10	.19
26	Team proportion male serial entrepreneur	.07	.05	−.05	.00	.07	.08	.04	.03	.30	.35	.97
27	Team proportion female executive	.03	.02	.00	.03	−.04	.00	−.06	−.06	.10	.05	.14
28	Team proportion male executive	.13	.05	−.04	−.04	.11	.05	−.01	.02	.26	.37	.71
29	Team proportion female manager	.00	.04	−.02	−.02	−.05	.02	.04	.03	−.04	.04	−.09
30	Team proportion male manager	.00	−.01	−.09	−.08	−.02	−.01	.04	.06	−.07	.15	−.25
31	Team proportion female professor	−.03	.00	.02	−.02	−.06	.01	−.01	−.06	−.03	−.16	−.10
32	Team proportion male professor	−.05	.00	.16	.17	−.05	.00	−.03	−.07	.00	−.28	−.05
33	Team proportion female scientist	−.01	.01	−.05	.15	−.01	.02	.05	.02	−.04	.01	−.11
34	Team proportion male scientist	−.05	−.03	.02	−.02	−.01	−.05	.02	.04	−.10	.00	−.21
35	Team proportion female doctor	.01	.02	.02	.00	−.05	−.02	−.02	−.05	−.04	−.03	−.05
36	Team proportion male doctor	.09	.04	−.04	−.03	−.01	−.05	−.06	.00	−.01	−.06	.03
37	Team proportion woman–PhD	−.06	−.01	−.01	.02	−.08	.03	.06	−.02	.00	−.12	−.12
38	Team proportion man–PhD	.00	−.01	.15	.08	.08	−.05	.00	.02	.01	.03	.07
39	Team proportion woman–MBA	−.03	.02	−.03	−.05	−.05	−.01	−.02	−.06	−.04	−.02	−.05
40	Team proportion man–MBA	.05	.05	−.08	−.02	.03	.05	.01	.02	.07	.09	.05
41	Team proportion woman–elite VC education	.05	.07	−.02	.12	.00	.05	.03	.00	.01	−.08	−.05
42	Team proportion man–elite VC education	.13	.14	.06	.09	.07	−.01	−.05	−.06	.10	.02	.07

[a]Grant funding programs: SBIR = Small Business Innovation Research, STTR = Small Business Technology Transfer.

TABLE A1
(Continued)

	Variable	12	13	14	15	16	17	18	19	20	21	22
12	Team proportion executive	1.00										
13	Team proportion manager	−.37	1.00									
14	Team proportion professor	−.23	−.20	1.00								
15	Team proportion scientist	−.26	.04	−.36	1.00							
16	Team proportion doctor	−.03	−.03	.21	−.08	1.00						
17	Team proportion PhD	−.12	−.04	.23	.03	−.21	1.00					
18	Team proportion MBA	.08	.13	−.16	−.06	−.07	−.22	1.00				
19	Team proportion elite VC education	.02	−.06	.17	−.01	.17	.22	−.07	1.00			
20	Team proportion woman	−.17	.00	.08	.01	−.06	.05	.04	−.02	1.00		
21	Team proportion woman IPO experience	.07	−.05	.02	−.04	−.01	.07	−.03	.03	.16	1.00	
22	Team proportion man IPO experience	.27	−.07	−.02	−.08	−.02	−.01	.06	.09	−.09	−.02	1.00
23	Team proportion woman industry experience	−.03	.07	−.09	.05	−.04	−.03	.02	−.07	.52	.31	−.05
24	Team proportion man industry experience	.40	.14	−.30	.01	−.06	−.02	.07	.02	−.28	−.05	.24
25	Team proportion female serial entrepreneur	.13	−.06	−.02	−.07	−.03	.00	−.02	.00	.27	.60	−.03
26	Team proportion male serial entrepreneur	.71	−.27	−.09	−.21	.02	.00	.03	.05	−.20	−.04	.32
27	Team proportion female executive	.17	−.08	−.04	−.08	−.05	.00	.02	−.01	.33	.48	−.03
28	Team proportion male executive	.97	−.36	−.23	−.24	−.02	−.12	.07	.03	−.25	−.05	.28
29	Team proportion female manager	−.11	.30	−.07	.00	−.04	−.02	.14	−.05	.46	−.02	−.04
30	Team proportion male manager	−.34	.92	−.18	.05	−.02	−.04	.08	−.04	−.19	−.05	−.06
31	Team proportion female professor	−.14	−.09	.36	−.12	.05	.09	−.08	.05	.55	.03	−.04
32	Team proportion male professor	−.18	−.17	.91	−.33	.20	.20	−.13	.16	−.16	.01	.00
33	Team proportion female scientist	−.13	.03	−.07	.27	−.09	.06	−.04	.05	.37	−.02	−.03
34	Team proportion male scientist	−.25	.02	−.32	.89	−.05	.04	−.05	−.04	−.10	−.03	−.09
35	Team proportion female doctor	−.07	−.02	.11	−.04	.23	−.03	−.05	.07	.31	−.01	−.04
36	Team proportion male doctor	−.01	−.03	.18	−.07	.96	−.21	−.06	.15	−.15	.00	−.01
37	Team proportion woman–PhD	−.16	−.02	.13	.01	−.07	.23	−.03	.01	.81	.20	−.06
38	Team proportion man–PhD	−.03	−.03	.15	.03	−.17	.86	−.20	.21	−.38	−.04	.02
39	Team proportion woman–MBA	−.04	.13	−.07	−.05	−.07	−.06	.40	−.06	.36	−.01	−.04
40	Team proportion man–MBA	.10	.09	−.14	−.04	−.04	−.21	.91	−.05	−.13	−.03	.08
41	Team proportion woman–elite VC education	−.08	−.02	.12	.03	.05	.08	−.04	.32	.39	.08	−.02
42	Team proportion man–elite VC education	.05	−.05	.13	−.02	.16	.20	−.06	.94	−.16	.00	.10

	Variable	23	24	25	26	27	28	29	30	31	32	33
23	Team proportion woman industry experience	1.00										
24	Team proportion man industry experience	−.12	1.00									
25	Team proportion female serial entrepreneur	.49	−.07	1.00								
26	Team proportion male serial entrepreneur	−.11	.39	−.05	1.00							
27	Team proportion female executive	.39	−.09	.80	−.05	1.00						
28	Team proportion male executive	−.13	.43	−.07	.74	−.08	1.00					
29	Team proportion female manager	.41	−.11	−.01	−.09	−.02	−.11	1.00				
30	Team proportion male manager	−.09	.19	−.06	−.24	−.07	−.33	−.10	1.00			
31	Team proportion female professor	.00	−.17	.00	−.11	−.01	−.14	.05	−.11	1.00		
32	Team proportion male professor	−.09	−.25	−.02	−.05	−.04	−.18	−.09	−.14	−.07	1.00	
33	Team proportion female scientist	.27	−.09	−.03	−.10	−.04	−.12	.14	−.03	−.05	−.05	1.00
34	Team proportion male scientist	−.05	.02	−.05	−.20	−.07	−.24	−.05	.05	−.05	−.32	.00
35	Team proportion female doctor	.14	−.09	−.02	−.05	−.02	−.06	.14	−.07	.37	−.04	.02
36	Team proportion male doctor	−.08	−.03	−.02	.04	−.04	.00	−.08	.00	−.06	.22	−.10
37	Team proportion woman–PhD	.32	−.24	.19	−.17	.23	−.22	.32	−.15	.58	−.12	.31
38	Team proportion man–PhD	−.20	.10	−.10	.09	−.12	.00	−.18	.04	−.22	.26	−.11
39	Team proportion woman–MBA	.19	−.08	.05	−.06	.17	−.08	.47	−.06	−.03	−.06	.02
40	Team proportion man–MBA	−.06	.12	−.04	.06	−.05	.12	−.06	.12	−.07	−.12	−.05
41	Team proportion woman–elite VC education	.06	−.11	.06	−.07	.04	−.09	.11	−.07	.40	−.05	.23
42	Team proportion man–elite VC education	−.09	.06	−.02	.08	−.02	.06	−.09	−.02	−.10	.19	−.03

TABLE A1
(Continued)

	Variable	34	35	36	37	38	39	40	41	42
34	Team proportion male scientist	1.00								
35	Team proportion female doctor	−.03	1.00							
36	Team proportion male doctor	−.04	−.04	1.00						
37	Team proportion woman–PhD	−.06	.18	−.12	1.00					
38	Team proportion man–PhD	.07	−.13	−.14	−.30	1.00				
39	Team proportion woman–MBA	−.06	−.02	−.06	.16	−.14	1.00			
40	Team proportion man–MBA	−.03	−.04	−.03	−.11	−.15	−.03	1.00		
41	Team proportion woman–elite VC education	−.06	.39	−.06	.38	−.13	.02	−.05	1.00	
42	Team proportion man–elite VC education	−.02	−.07	.19	−.13	.27	−.07	−.04	−.02	1.00