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Women's Academic Entrepreneurship: Understanding Gender Disparities

Suggested Citation: Alice Civera, Greta Temporin, Azzurra Meoli, Federico Caviggioli and Alessandra Colombelli (2025), "Women's Academic Entrepreneurship: Understanding Gender Disparities", *Foundations and Trends® in Entrepreneurship*: Vol. 21, No. 6, pp 591–737. DOI: 10.1561/0300000129.

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Contents

1	Introduction	593
2	The Entrepreneurial Process in Academia	598
2.1	Mindset	600
2.2	Intention	601
2.3	Action	602
3	Theories in Entrepreneurship: A Gender Perspective	606
3.1	Mindset	606
3.2	Intention	613
3.3	Action	616
4	Narrative Review Method and the Proposed Framework of Analysis	622
5	Theories for Female Academic Entrepreneurship	628
5.1	Mindset	628
5.2	Intention	644
5.3	Action	663

6 Discussion and Conclusion	689
6.1 Mindset	694
6.2 Intention	696
6.3 Action	697
About the Authors	701
References	704

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ABSTRACT

This monograph provides an overview of the current state of female participation in academic entrepreneurship and focuses on theories, approaches, and evidence in the university setting. Women represent a valuable yet underrepresented capital for economies and societies, and universities have recently made the effort to support and foster female participation in both science and entrepreneurship. However, differences in entrepreneurship rates between men and women still exist. This monograph offers a comprehensive framework drawn from the process-based concept of academic entrepreneurship, encompassing mindset, intention, and action. Each phase is discussed separately in terms of both student and faculty entrepreneurship, with the aim of detecting complementary findings and theories. Special focus is placed on the influence of context, since the unique

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factors of a university setting might mitigate the gender disparity in academic entrepreneurship and offer avenues for further investigation. In doing so, this monograph seeks to identify gaps in the field and areas for future research.

1

Introduction

Academic entrepreneurship is a critical driver of innovation (Acs *et al.*, 2009) and economic growth (Romer, 1986). It refers to the commercialization of knowledge and technologies developed in academia by students and faculty members. Academic entrepreneurship plays a crucial role in bridging the gap between university and industry (Correia *et al.*, 2024) and favors new job creation (Wright *et al.*, 2007) and societal wellbeing (Siegel and Wright, 2015). The literature on academic entrepreneurship is dynamic and gaining momentum (Civera *et al.*, 2020; Fini *et al.*, 2018; Hayter *et al.*, 2018; Prokop, 2021). Scholars have increasingly targeted this topic to improve understanding of the key issues and the actors involved (Correia *et al.*, 2024). The research stream that examines female participation in the academic entrepreneurial ecosystem is currently a relatively modest area with growth potential (Halilem *et al.*, 2022). However, at the moment, there is no evidence of an organic reference framework, and recent literature reviews (e.g., Correia *et al.*, 2024; Hayter *et al.*, 2018) seem to have neglected this topic.

The number of papers dealing with this topic stems from a historical lack of interest in the gender dimension of academic entrepreneurship. Until the end of the 2000s, the gender dimension was examined in a

handful of articles dealing with university entrepreneurship (Rothaermel *et al.*, 2007; Thursby and Thursby, 2005). Among the reasons for underinvestigating this phenomenon is a lack of data on entrepreneurial activities from students and faculty in general, which rely mostly on local samples that do not allow an international comparison (Poggesi *et al.*, 2019). Similarly, academic entrepreneurial activities are multifaceted and difficult to codify and track over time (Abreu and Grinevich, 2024). This results in low rates of university entrepreneurship activities established by academic women.

Despite the increasing participation of women in academia, a gender gap can be found in many aspects of the university system, and women remain particularly underrepresented in academic entrepreneurship (Goel *et al.*, 2015). A bibliometric analysis from Larivière *et al.* (2013) shows that gendered disparities in science are a global phenomenon. For example, on a global scale, female academics account for less than 30% of authorship and are less cited than male academics. Similar data can be found among patenting individuals. Despite the positive trend in recent decades, female inventors are still around 13–15% of all inventors (Caviggioli *et al.*, 2023). In addition, men are three times more likely than women to own a business (Piacentini, 2013). This gender gap is observed not only in the broader entrepreneurial landscape but also in the area of academic entrepreneurship (Goel *et al.*, 2015). This disparity can be found in all activities that incorporate an entrepreneurial approach in academia. According to recent data, women researchers and professors are less likely than men to disclose their inventions (Colyvas *et al.*, 2012), hold a patent (Allen *et al.*, 2007; Murray and Graham, 2007; Whittington, 2011), or establish a firm on the basis of their research (Civera and Meoli, 2023; Lauto *et al.*, 2022; Woolley, 2019). Despite the limited evidence of studies focusing on university students, there is consensus in finding a lower share of female entrepreneurs than male (Epstein *et al.*, 2022; Moreno-Gómez *et al.*, 2022; Piva and Rovelli, 2022).

Scholars who have investigated the underrepresentation of women in entrepreneurial activities often rely on the metaphor of the “leaky pipeline” (Clark Blickenstaff, 2005; Polkowska, 2013) to explain the phenomenon. While this metaphor was originally used to illustrate

the shortage of candidates, both male and female, in scientific careers (Berryman, 1983), in recent decades it has mostly been used to describe women's trajectories in science (Morganson *et al.*, 2010; Sassler *et al.*, 2017). The leaky pipeline refers to the constant drain of women in each educational or career stage: from students in secondary school, through university degrees, to doctoral positions, to jobs in science and technology, whether in academia or in the business sector (Hunt *et al.*, 2013; Reed *et al.*, 2011; Toivanen and Väänänen, 2016). For example, Germany and the UK both exhibit high proportions of female life science doctoral graduates, at 46.7% and 56.6%, respectively. The figures decline markedly when viewed as the proportion of women employed as scientific researchers in higher education, with 14% of females in Germany and 31% in the UK (Haeussler and Colyvas, 2011).

Within academia, women are not only less represented but also experience a less supportive environment than men. Woolley (2019), for instance, reported that in the US, women earn less and are promoted to full professor at a slower rate than their male counterparts (American Society for Engineering Education, 2023; National Science Foundation, 2023). Women are also disproportionately overrepresented among part-time, temporary, and nontenure track faculty (Blume-Kohout, 2014). The same happened in the UK (Abreu and Grinevich, 2017; Rosa and Dawson, 2006) and Italy (Civera *et al.*, 2021). The lack of women in advanced academic positions results in several challenges, including an overburdening of those few women in these roles (Ward and Wolf-Wendel, 2012) and a lack of role models for the next generation (Clark Blickenstaff, 2005; Tartari and Salter, 2015). Thus, studies have shown that female faculty members are often burdened with a heavier service and teaching load than their male colleagues (Guarino and Borden, 2017; Hart, 2016).

Although women represent fewer than half of the faculty in several disciplines, their presence is especially low in engineering and some technology fields (Tartari and Salter, 2015). The particularly unbalanced nature of the demographics of female and male academics in the so-called STEM (Science Technology Engineering and Math) disciplines exacerbates the underrepresentation of female entrepreneurs since these areas are where academic entrepreneurship is more likely to

emerge. Scholars who have tried to investigate the dynamics of leaky pipelines have suggested that the gender gap is attributable both to personal characteristics (Vázquez-Cupeiro and Elston, 2006) and to discrimination experienced in their context (Parker *et al.*, 2017).

In spite of the current situation, the gender gap can be reduced more easily in academic entrepreneurship than in other contexts (Civera and Meoli, 2023; Lauto *et al.*, 2022; Sugimoto *et al.*, 2015; Whittington, 2011). Women and men in academia are characterized by similar levels of human capital and by similar attitudes, pressures, and motivations (Rosa and Dawson, 2006). Moreover, universities have oriented themselves toward a more entrepreneurial attitude (Etzkowitz and Leydesdorff, 2000) by stimulating new enterprises and creating a supportive environment for both men and women who are willing to be entrepreneurs.

Regardless of all this, the underrepresentation of women in academic entrepreneurship is a significant issue that warrants thorough investigation. This is not only a matter of fairness and equality but also of economic efficiency and innovation potential (Abreu and Grinevich, 2017; Muscio and Vallanti, 2022). Women represent a substantial portion of the intellectual talent in our society, and their underutilization in the entrepreneurial sector represents a significant loss of potential innovation and economic growth (Bell *et al.*, 2019). Furthermore, diversity, including gender diversity, has been shown to enhance problem solving and creativity, key elements in the entrepreneurial process (Minniti, 2009). Therefore, understanding and addressing the gender gap in academic entrepreneurship could lead to more effective utilization of human resources, increased innovation, and improved economic performance.

This monograph is devoted to analyzing what we know so far about female engagement in academic entrepreneurship and the main theories and methodologies adopted. It then uses these analyses to delineate future research on the topic. The objective of this literature review is to synthesize existing research on gender issues in academic entrepreneurship. Despite the growing interest in this topic, the current body of literature is fragmented and lacks a comprehensive overview. This review aims to fill this gap by providing a narrative review built on a comprehensive framework derived from the process-based definition of academic entrepreneurship: from mindset to intention and finally

to action. First, we focus on the entrepreneurial mindset of academic entrepreneurs by investigating specific differences in cognitive attributes and personality traits between men and women. Second, we consider the entrepreneurial intentions of academic entrepreneurs who can perceive academia as more or less supportive depending on their gender.

Third, the entrepreneurial action phase is deeply analyzed by disentangling the formal, informal, and noncommercial mechanisms of academic entrepreneurial activities. Divergences in men's and women's participation in each activity are discussed. Moreover, as academic entrepreneurship is made up of both student and faculty entrepreneurship, we maintain these two streams separately to understand the main findings from the respective literature and suggest either complementary or substitute keys of interpretation. Finally, special attention is devoted to the role of context, as special elements at the university level and at a finer-grained level can moderate the gender gap in academic entrepreneurship, providing ideas for future research. By doing so, this review aims to provide a clearer picture of what is currently known about gender issues in academic entrepreneurship, what questions remain unanswered, and what areas require further investigation. This will not only contribute to the academic understanding of this topic but also provide practical insights for policymakers, educators, and entrepreneurs.

The remainder of the monograph is structured as follows. The next section provides definitions and background literature on the entrepreneurial phases, with particular attention to academia. Section 3 introduces the main theories adopted in the context of academic entrepreneurship, specifically encompassing gender issues. Section 4 proposes the theoretical framework that we adopted to organize the literature and the general descriptive statistics of the examined corpus of articles. Section 5 details several research areas identified in our scheme. The paper concludes with a discussion of future research avenues and the implications of the findings for theory, practice, and policy.

2

The Entrepreneurial Process in Academia

Entrepreneurship has always been considered essential for economic growth (Schumpeter, 1934; Baumol, 1990), and understanding the entrepreneurial process and its characteristics has been considered highly relevant to encouraging entrepreneurial activity. The entrepreneurship literature has made a great effort to explain how new ventures originate, and as a result, has provided different theoretical and empirical contributions to better understand the process (Schlaegel and Koenig, 2014).

The entrepreneurial process has been extensively studied, and much is now known about how it develops (Bygrave, 2009). The birth of a business is preceded by an unseen phase that occurs mainly in the mind of the future entrepreneur. This phase depends on the mindset of the prospective entrepreneur and centers on entrepreneurial intention. Only later does this intention transform into the decision to start a business (Battistelli and Odoardi, 2008). The process can be represented as a funnel that gradually narrows. Initially, many business ideas emerge from many aspiring entrepreneurs, but only some translate into entrepreneurial decisions; an even smaller proportion of projects are finally launched and, eventually, become growing businesses.

Intention is strongly linked to the mindset and human capital factors of potential entrepreneurs, particularly personality traits and typical motivations. In other words, the intention develops within the person based on some of their characteristics, past and current life experiences that might have exposed them and brought them closer to entrepreneurship. In addition, it is fueled by elements derived from the external context, such as the presence of employment opportunities as alternatives to starting a business, the value attributed to the entrepreneur figure in one's environment and, more generally, in society, and the economic opportunities available in the local area or country.

Entrepreneurial intention is indeed a mental disposition that directs our attention toward a specific goal and the path to achieving it (Hill *et al.*, 1977). The goal can appear to the potential entrepreneur in various forms: A product or service imagined in all its parts, a physical space whose economic potential is glimpsed, a technology that fascinates, a sector or market the entrepreneur absolutely wants to enter, or a community problem their social enterprise intends to address.

There is a moment when one decides to take steps to become an entrepreneur. This decision is activated by a set of external circumstances. One chooses the entrepreneurial path in various life and work situations and opportunities: out of "necessity" (having lost a previous job, being unable to enter the labor market, wanting to leave an unsatisfactory activity, etc.) and/or out of "opportunity" (receiving an entrepreneurial proposal from others, encountering an unmissable opportunity, having the time to dedicate to one's project, etc.).

Up to this point, the business exists only as a project, based on a series of hypotheses and assumptions related to the business model, the estimated capital required for the startup, and a group of founders who have yet to prove themselves as a working team. This is the phase in which the entrepreneurial project is put to the test and in which the risk of error and failure is greatest. The startup or business launch phase thus has an irreplaceable experimental function to test the business project when it is still easy and not costly to evolve it, profoundly modify it, and adapt it to market reality.

Having successfully completed the first steps, the new business faces a stage of dimensional and qualitative development in terms of both the

business and internal consolidation. At this stage, uncertainties related to product or service development, business model solidity, and market responses are similar to those of any expanding company (Mueller, 1972): revenue growth, increase in customer base, enhancement of marketing, search for new personnel, potential capital increases, addition of new partners, structuring of internal processes, and territorial expansion.

In the present review, following the general approach, we synthesized the different steps of the entrepreneurial process by focusing on three dimensions:

- Mindset, the antecedent of entrepreneurial intention
- Intention, which does not necessarily translate into action
- Action, which involves the different steps from the decision to start an entrepreneurial project

The literature often focuses on exploring the links among the three aspects; hence, there is not always a clear-cut difference among them. However, whenever possible, we allocate the identified studies to the most suitable category according to their content and the aspects they highlight the most. Below, we characterize the three dimensions of the entrepreneurial process and frame them in the academic setting.

2.1 Mindset

There is a lack of consensus regarding the precise definition of the entrepreneurial mindset and the criteria for its assessment. Despite numerous scholarly investigations exploring the factors underlying entrepreneurial intentions and behaviors, not all employ the specific term “entrepreneurial mindset.” However, in examining studies that explicitly utilize this terminology and elucidate its conceptual boundaries, it becomes evident that the purported “entrepreneurial mindset” encompasses a constellation of cognitive attributes that vary in their manifestation among individuals (Haynie *et al.*, 2010; Krueger, 2015). Furthermore, these attributes are subject to modification and development over time and through experiences, yet collectively reflect a mode of thinking and behaving that contributes to entrepreneurial success,

such as the ability to recognize and act on opportunities, take risks, and show innovativeness (Covin and Slevin, 2017; Daspit *et al.*, 2023; Pidduck *et al.*, 2023); this sets entrepreneurs apart from their peers in shaping entrepreneurial intentions and endeavors (Cui *et al.*, 2021).

Typically, academic papers addressing the entrepreneurial mindset endeavor to assess the prevalence and influence of specific psychological constructs in individuals demonstrating entrepreneurial intentions or engaging in entrepreneurial actions (Krueger, 2015). These investigations often adopt an evaluative/predictive approach, aiming to ascertain whether the presence and extent of certain characteristics correlate with heightened or diminished entrepreneurial intentions (Pfeifer *et al.*, 2016; Mukhtar *et al.*, 2021), while less attention has been paid to the correlation between action and success.

Within the body of literature framed in the domain of academic entrepreneurship, particular emphasis has been placed on examining the impact of exposure to specific educational programs on the development of entrepreneurial mindset characteristics. The primary objective of these inquiries is to assess the extent to which such programs contribute to the enhancement of these traits (Colombelli *et al.*, 2022a,b). Frequently, studies that aim to pinpoint the determinants of entrepreneurial intention in the academic context also delve into the exploration of mindset and attitude, thereby concurrently aiding in the delineation of the key characteristics of the entrepreneurial mindset, even though it is not their main focus.

2.2 Intention

Scholars agree that socio, psychological, and cognitive processes can help elucidate the entrepreneurial process and its related factors (Douglas and Shepherd, 2000; Krueger *et al.*, 2000; Shane and Venkataraman, 2000). As the creation of a new venture involves planning and thinking from the individual, making it an act of will, it is natural to investigate its characteristics through formal intention models (e.g., Ajzen, 1991; Bird, 1988; Krueger and Carsrud, 1993). Theories about intentions provide frameworks for explaining and predicting behaviors, including entrepreneurship.

Indeed, entrepreneurial intentions are the first step in the process of discovering, creating, and acting on opportunities (Schlaegel and Koenig, 2014). Entrepreneurial intentions are related to personal perceptions about the supportiveness of a given society, the business environment, and one's abilities (Bird, 1988). Given that entrepreneurship is an embedded phenomenon that does not exist in isolation but is deeply integrated into the broader context or environment in which it operates, subjective perceptions of the individual's environment and relative position within it are crucial (Jack and Anderson, 2002). Hence, entrepreneurial intentions are only partially related to mindset but also to other experiences and personal perceptions.

Within the body of literature framed in the domain of academic entrepreneurship, there has been a particular focus on understanding the antecedents of entrepreneurial intentions to assess the key factors that might facilitate and support the formation and subsequent translation of entrepreneurial intention. Attitudes, encompassing attitude toward the behavior, subjective norms, and perceived behavioral control, are the strongest predictors of intention. Subsequently, factors such as traits, demographics, and skills influence attitudes, thereby indirectly shaping intentions and behavior (Shapero and Sokol, 1982). Indeed, the literature has devoted much attention to understanding the role of such characteristics in the formation of intentions. However, attitudes, and consequently intentions, are also affected by social, cultural, and financial support. In particular, in the context of academic entrepreneurship, an important stream of research has recently investigated the role of entrepreneurial education in fostering the formation of entrepreneurial intention (e.g., Souitaris *et al.*, 2007).

2.3 Action

The action phase involves mechanisms through which entrepreneurial activities are realized. Action typically refers to the foundation of a new venture. In a broader sense, however, it also refers to initiatives such as the identification of new, underexploited, or unexploited business opportunities and the subsequent production of new economic activity,

even within established companies (Munyo and Veiga, 2022), or the ability to translate inventions or technologies into products and services.

With reference to the academic setting and the subjects involved (i.e., students and faculty members), a range of activities can be considered entrepreneurial; three main categories can be identified. The first category covers the most traditionally studied activities in the academic entrepreneurship literature, denoted as *formal commercial activities*. The creation of new firms (i.e., spinoffs or spinouts), patenting, and licensing belong to this group. New firms are usually characterized by technological inventions, and commercialization can occur through the growth of the new venture (up to acquisition or exit) or the presence of intellectual property mechanisms, often managed with the support of institutional structures such as the university Technology Transfer Office (TTO). Within this category, there are some differences in the extent to which tacit knowledge plays a role. For instance, technologies that require the close involvement of the inventor may result in a spinout rather than a license (Jensen and Thursby, 2001; Shane, 2004).

The second category includes entrepreneurial activities that occur via commercial transactions but that are based on knowledge that cannot easily be protected using formal methods such as IP rights. These are known as *informal commercial activities*. Because these activities are based on knowledge that is much more tacit in nature, they are often arranged with little or no help from TTOs (Wright *et al.*, 2007). Knowledge that cannot be patented, such as that contained in databases, software, literary or artistic works, industrial designs, and plant or animal varieties, can sometimes be protected by other means such as copyright or trademarks, but this is often not actively sought by the TTO. This category includes consultancy businesses, contract research, and joint research projects undertaken with nonacademic partners (Blumenthal *et al.*, 1986, 1996; D'Este and Patel, 2007; Jensen *et al.*, 2010; Lam, 2007).

The third category covers those activities based on knowledge that is highly tacit and that cannot easily be IP protected, or where the academic involved is unwilling or unable to protect the knowledge on which the activities are based. These are defined as *noncommercial activities*. As a result, these activities are often arranged informally, with little or

no involvement of the TTO. They are often carried out for reasons other than immediate financial rewards, such as increasing the reputation and prestige of the academic or institution, building relationships expected to lead to further commercial activities, or enhancing social welfare. This category includes providing informal advice, giving public lectures, organizing exhibitions, and publishing books for a general audience.

Until now, the literature has focused on a small range of activities (Woolley, 2019), including invention disclosures by academics to the TTO (Thursby and Thursby, 2005), patenting of research outputs (Agrawal and Henderson, 2002; Henderson *et al.*, 1998; Owen-Smith and Powell, 2003; Stephan *et al.*, 2007), licensing of research outputs (Jensen *et al.*, 2003; Markman *et al.*, 2005; Siegel *et al.*, 2003), and new firm formation (Di Gregorio and Shane, 2003; O'Shea *et al.*, 2007; Stuart and Ding, 2006).

The main reason for this relatively narrow focus is that *formal commercial activities* are the most similar to those analyzed by the wider literature on entrepreneurship (Abreu and Grinevich, 2014). The process usually starts with an invention with commercialization potential (Wood, 2011). The process then typically involves disclosure of the invention to the institutional TTO, which is generally involved in the rest of the process through commercialization and beyond (Daniel and Alves, 2020). While universities might retain revenues from the commercialization of IP-based inventions, the economic gain is generally less obvious in relation to other forms of entrepreneurial engagement involved in knowledge transfer/exchange (Halilem *et al.*, 2017).

Consequently, the other forms of commercialization of academic knowledge are generally considered less interesting for the TTO to be involved in Grimaldi *et al.* (2011), even if they could be effective in commercializing knowledge to industry (Mody, 2006). This is problematic because informal commercialization, such as consultancy services, represents a significant channel of diffusion of scientific knowledge (Perkmann and Walsh, 2008). This is easily seen if we consider that only half the higher education institutions in the UK routinely use IP protection methods beyond the filing of patents (HEFCE, 2007). This approach also has an indirect consequence, as data availability is limited to formal

activities, making it less straightforward to analyze a comprehensive set of informal activities.

3

Theories in Entrepreneurship: A Gender Perspective

In this section, the main theories adopted to study entrepreneurial mindset, intention, and action are examined through the lens of gender studies.

3.1 Mindset

The following paragraphs address the main theories that the literature has employed when considering the entrepreneurial mindset. Table 3.1 provides a summary of these theories, along with their main characteristics and definitions.

On a general level, the social constructionist perspective delineates gender identity (as masculine or feminine) and biological sex (as male or female) as distinct constructs. Masculinity and femininity, as gendered qualities, stem from culturally established definitions and societal expectations of behaviors and attributes associated with males and females, rather than inherent disparities, as posited by essentialist perspectives (Ahl, 2006; Butler, 1990). Traditionally, masculinity has been linked to the realms of work and career, characterized by traits such as assertiveness, ambition, and resilience. Numerous studies have suggested that

Table 3.1: Summary of the main theories adopted when studying the entrepreneurial mindset and the presence of gender differences

Theory	In a Nutshell
Gender schema theory Bem (1981)	Individuals develop cognitive frameworks related to gender that affect the understanding of themselves and others and shape their preferences, attitudes, and behavior. This theory employs the so-called “Sex Role Inventory.”
Social constructionist theory	Gender identity (as masculine or feminine) and biological sex (as male or female) are distinct constructs. Masculinity and femininity stem from cultural and societal expectations.
Butler (1990)	Gender identity (as masculine or feminine) and biological sex (as male or female) are distinct constructs. Masculinity and femininity stem from cultural and societal expectations.
Social feminism	Differences between women and men are due to unique socialization processes.
Carter and Williams (2003)	No differentiation between gender identity and biological sex, but gender (or sex) role orientation denotes a personality and value system shaped by traditional social norms.
Social role theory (SRT)	The orientation toward entrepreneurship is determined by traits. Main traits: risk-taking, proactivity, innovativeness. Secondary traits: autonomy, aggressiveness.
Eagly (2013)	Five personality traits influence career trajectories and success: extraversion, agreeableness, conscientiousness, neuroticism, and openness.
Entrepreneurial orientation (EO)	Greater levels of human capital are associated with an increased likelihood of identifying opportunities and possessing the capacity for innovation. Human capital refers to a collection of skills and competencies acquired by individuals through formal education and experience.
Lumpkin and Dess (1996)	Human motivation and behavior in the career trajectory are governed by foresight and expectations. There are three main dimensions: personal factors, environmental influences, and behavior. Among personal factors, the most relevant is self-efficacy, i.e., confidence in one’s ability to succeed in a particular domain or career.
Big Five personality traits	
Digman (1990)	
Human capital theory (HCT)	
Becker and Woessmann (2009)	
Social cognitive theory (SCT) and social cognitive career theory (SCCT)	
Bandura (1989) Lent <i>et al.</i> (2002)	
Self-determination theory (SDT)	
Ryan and Deci (2000)	People have inherent growth tendencies and innate psychological needs that are the basis for the motivation behind people’s choices. They are classified as progressive (e.g., profit expectations, entrepreneurial passion, and the need for achievement) and regressive (e.g., the desire to be independent and autonomous and overconfidence) factors.
Push and pull motivation theories	
Dawson and Henley (2012)	People have inherent growth tendencies and innate psychological needs that are the basis for the motivation behind people’s choices. They are classified as push and pull factors. The push type refers to an individual’s drive to a desired state (e.g., frustration with job conditions, household burdens). The pull type refers to an incentive that draws the individual forward (e.g., autonomy, income).

entrepreneurship is socially constructed as masculine because the cognitive and attitudinal traits associated with entrepreneurial endeavors align with culturally defined masculine qualities (Goktan and Gupta, 2015; Jones, 2014).

Among the prominent theories elucidating the components of the entrepreneurial mindset in terms of gender, one of the most notable is entrepreneurial orientation (EO). While the EO theoretical framework has been developed to conceptualize organizational behavior, it has also been frequently utilized to examine individuals' inclinations toward entrepreneurial attitudes and behaviors. As posited by Lumpkin and Dess (1996), EO comprises five pivotal dimensions: (i) innovativeness, reflecting a predisposition to endorse and foster novel and imaginative ideas and initiatives; (ii) proactivity, encompassing not only the inclination to take initiative but also to do so amid competitive contexts; (iii) risk-taking, indicative of a willingness to allocate resources even in the face of uncertain outcomes; (iv) autonomy, denoting a preference for independent decision-making in business implementation; and (v) aggressiveness, signifying the endeavor to surpass competitors and overcome challenges in a competitive marketplace (Dess and Lumpkin, 2005). However, prior investigations into EO and subsequent empirical analyses aimed at testing these theories have predominantly focused on the dimensions of innovativeness, proactivity, and risk-taking, while overlooking the dimensions of autonomy and aggressiveness (Goktan and Gupta, 2015; Marques *et al.*, 2018). Various scholarly works have found that EO can manifest differently among individuals based on diverse background and demographic characteristics. These characteristics include gender identity, cultural background, and learning context, encompassing both familial and organizational influences (Covin and Miller, 2014). Furthermore, the EO dimensions are resonant with the attributes related to masculinity from the social constructionist perspective.

Broadly speaking, some studies on gender and entrepreneurial mindset have discussed specific personality traits that are influenced by innate nurturing, socialization, education, and formed values and beliefs. These traits can significantly impact the entrepreneurial process. One of the most prominent theories in this context is the Big Five personality

traits theory (Digman, 1990). This framework comprises five dimensions: (i) extraversion, which captures an individual's comfort level with relationships; (ii) agreeableness, which refers to an individual's propensity to defer to others; (iii) conscientiousness, which measures reliability; (iv) neuroticism, which assesses a person's ability to withstand stress; and (v) openness, which reflects an individual's range of interests and fascination with novelty (John and Srivastava, 1999). The Big Five theory is a widely recognized and utilized model for understanding personality across various contexts and has been viewed as a strong predictor of career preferences, including entrepreneurial choices (Bajwa *et al.*, 2017; Zhao and Seibert, 2006). Usually, a positive relationship exists between the entrepreneurial process and extraversion, conscientiousness, and openness to experience, while it can be negatively affected by neuroticism and agreeableness (Bazkiaei *et al.*, 2020; López-Núñez *et al.*, 2020); however, agreement on these results can vary (Jhamb *et al.*, 2022; Murugesan and Jayavelu, 2017). Many studies that employed the Big Five theory have focused on the relationship between personality traits, gender, and entrepreneurial intention; however, these analyses have important implications for understanding gender differences in the formation of the entrepreneurial mindset.

A different stream of studies focuses on human capital theory (HCT). Human capital refers to a collection of skills and competencies acquired by individuals through formal education and experience, which may have general applicability or be specific to particular firms or industries (Becker and Woessmann, 2009). Existing literature suggests that greater levels of human capital are associated with an increased likelihood of identifying opportunities and possessing the capacity for innovation (Davidsson and Honig, 2003; Marvel and Lumpkin, 2007). As mentioned, these capabilities are aspects of the entrepreneurial mindset. Previous research within the entrepreneurship domain has highlighted the presence of gender disparities in human capital at the outset of a business venture and in terms of opportunity identification (Marvel *et al.*, 2016). Some studies have provided insights into gender differences from the perspective of social feminist theory, which is closely aligned with the social constructionist viewpoint on gender. Social feminism posits that discrepancies between women and men stem from distinct socialization

processes (Carter and Williams, 2003). Within the context of HCT, social feminism offers a framework for understanding how these different experiences may contribute to the development of diverse human capital among men and women, subsequently influencing opportunity identification and innovativeness (de Los Dolores González and Husted, 2011; DeTienne and Chandler, 2007).

Another sociocognitive characteristic that has garnered significant attention concerning gender, entrepreneurial mindset, and university students is self-efficacy. Self-efficacy lies at the heart of Bandura's social cognitive theory (SCT) (Bandura, 2001) and its subsequent extension, social cognitive career theory (SCCT) (Lent *et al.*, 2002). Embedded at the intersection of personality psychology and various other disciplines, SCT posits that human motivation and behavior are governed by foresight and expectations, which are shaped by the interplay of personal factors, environmental influences, and behavior itself. A pivotal determinant of motivation and behavior in this framework is self-efficacy, defined as an individual's belief in their capacity to accomplish a specific task or pursue an action (Bandura, 1977). SCCT applies this conceptual framework to the realm of career choice, asserting that self-efficacy, representing confidence in one's ability to succeed in a particular domain or career, serves as a foundational precursor in career decision-making (Hackett and Betz, 1981).

Since the formulation of this theoretical framework, numerous studies have investigated the relationship between levels of self-efficacy and individuals possessing diverse demographic characteristics, such as gender, as well as the associations between these variations and various career preferences in specific domains. Several entrepreneurship theorists have proposed the existence of so-called entrepreneurial self-efficacy (ESE) as the belief in one's capability to successfully undertake entrepreneurial tasks, activities, or ventures (De Noble *et al.*, 1999). As in other cases of career self-efficacy, ESE develops over time and is influenced by a number of external and internal factors, such as upbringing, education, economic circumstances, personality, and characteristics such as gender, with evidence suggesting that women have lower ESE (Wilson *et al.*, 2007).

Some studies have expanded their investigation beyond merely delineating gender differences in levels of ESE using social role theory (SRT) (Eagly, 2013) and the notion of gender role orientation to provide a more nuanced theoretical underpinning. Gender role orientation denotes a personal trait or value system shaped by traditional social norms, where men are expected to embody masculine traits and women to exhibit feminine characteristics. According to SRT, individuals undergo socialization from the early stages of life to internalize traits and behaviors deemed suitable for their gender. Certain roles and professions are stereotypically associated with masculinity, while others align with femininity. Consequently, individuals tend to cultivate personality traits and pursue careers congruent with their gender role orientation. One frequently employed framework within this context is gender schema theory (Bem, 1974, 1981).

This theory posits that individuals develop cognitive frameworks related to gender that, first, affect their understanding of themselves and others and, second, shape their preferences, attitudes, and behavior. This schema relies on the so-called Sex Role Inventory, which categorizes individuals into four distinct groups. Individuals scoring high on masculinity and low on femininity are classified as masculine, while those scoring high on femininity and low on masculinity are categorized as feminine. Those scoring high on both masculinity and femininity are labeled as androgynous, while individuals scoring low on both dimensions are designated as undifferentiated. This framework has provided a foundation for investigating the relationship between gender roles and self-efficacy within the entrepreneurial domain. Studies relying on it have found that having an androgynous gender role orientation is positively associated with entrepreneurial self-efficacy (Mueller and Dato-On, 2008, 2013).

The literature has also examined motivation, defined as the process that initiates, guides, and maintains goal-oriented behaviors to understand what drives individuals to start a new business. As previously mentioned, this area is strongly linked to the “intention” group of studies. The main theoretical approach used by the literature in this domain is self-determination theory (SDT), which focuses on human motivation and personality and posits that people have inherent growth tendencies

and innate psychological needs that are the basis for the motivation behind their choices (Ryan and Deci, 2000). Among the determinants of entry, a vast body of literature underlines the role of progressive factors, such as demand and profit expectations, which are linked to the desire to make money (Arauzo-Carod and Segarra-Blasco, 2005; Khemani and Shapiro, 1986; Mansfield, 1962; Orr, 1974), typically of an economic nature (Acs *et al.*, 2004). For example, in the economic literature, beginning with Mansfield (1962), the entrepreneur is described as an individual motivated to start a new firm by the prospect of earning profits.

Other progressive drivers are entrepreneurial passion, which refers to a psychological state characterized by intense positive emotional arousal, internal drive, full engagement with personally meaningful work activities, and the need for achievement (a personality trait characterized by an enduring and consistent concern with setting and meeting high standards of achievement). All these progressive factors have been positively associated with the post-entry performance of a new firm (Baum and Locke, 2004; Johnson, 1990). In contrast, the literature has also highlighted the existence of regressive factors: the desire to be independent, which refers to the desire for freedom and not to be subject to control by others; autonomy, which refers to the need and ability of a person to make their own decisions and to be self-directed in thought, feeling, and action (Blanchflower and Meyer, 1994; Blanchflower and Oswald, 1998; Creedy and Johnson, 1983; Evans and Leighton, 1990); and overconfidence (Åstebro, 2003; Camerer and Lovallo, 1999; Coelho *et al.*, 2004). These factors, which motivate an individual to begin an entrepreneurial journey, have proved to be negatively correlated with post-entry performance, such as firm survival and growth (Vivarelli, 2007). Finally, the literature discusses necessity-based entrepreneurial motivation, which occurs when individuals engage in entrepreneurial activities because other employment options are either unavailable or unsatisfactory (Reynolds *et al.*, 2002). This type of motivation may disproportionately affect women due to horizontal and vertical labor market segregation, which restricts the number and type of available employment opportunities (Verheul *et al.*, 2006).

Other research employs another dichotomous conceptualization of entrepreneurial motivation, often referred to as push versus pull theories of motivation. The push motive refers to an individual's drive to reduce the tension caused by the gap between their current and desired states. The pull motive refers to an incentive that draws the individual forward. Push motives toward entrepreneurship include the threat of unemployment, frustration with job conditions, or household and care burdens, which are similar to the already discussed necessity-based motivations. Pull motives involve incentives for pursuing new ventures, such as autonomy, independence, income, and wealth (Dawson and Henley, 2012). Other studies, such as those based on Goal Content Theory (GCT), which is derived from SDT, also use a dichotomy of extrinsic versus intrinsic entrepreneurial motivation. Intrinsic goals include intrinsic interest, community contribution, health, and affiliation, while extrinsic goals encompass financial success, fame, and reputation (Vansteenkiste *et al.*, 2006). The impact of these motivational factors may vary between genders, influencing attitudes toward entrepreneurship in gender-specific ways (Arshad *et al.*, 2021).

3.2 Intention

The development of entrepreneurial intentions marks the initial phase of the entrepreneurial process as the phase immediately following “mind-set.” Thus, understanding the factors underlying the formation of entrepreneurial intentions is pivotal for our understanding of entrepreneurship as a whole, and it is essential in elucidating the disparity between female and male participation in the venture creation process. Given that the inception of an entrepreneurial journey hinges on the formation of entrepreneurial intentions, we need to leverage intentional theories to better understand the factors contributing to women's comparatively lower propensity to initiate their ventures.

Two main theories have emerged in the context of intentions: Ajzen's (1991, 2011) theory of planned behavior (TPB) and Shapero and Sokol's (1982) entrepreneurial event model (EEM). They are similar in predictive power (Schlaegel and Koenig, 2014) and converge on the premise that the intention to act is the best predictor of engaging in entrepreneurial

behavior (Lee *et al.*, 2011). These theories focus on pre-entrepreneurial events and are based on attitudinal and behavioral theory (Ajzen, 1991) and self-efficacy and social learning theory (Bandura, 1989). Moreover, they also integrate exogenous factors that help explain entrepreneurial attitudes and intentions (Bird, 1988). In this respect, the TPB has also been adopted to investigate personality traits such as proactivity and risk-taking, which might fall under the “mindset” phase (Laudano *et al.*, 2019). However, TPB has primarily served as a theoretical framework for investigating entrepreneurial intention; hence, this review categorizes it into the “intention” phase rather than the “mindset” group.

The TPB is a general psychological theory applicable to and validated across a range of human behaviors. It has dominated recent research on entrepreneurial intentions (e.g., Schlaegel and Koenig, 2014). TPB suggests that the most proximal determinant of behavior is the intention to engage in that behavior. Intention captures the degree of motivation toward exerting effort on a particular act. Ajzen (1991) argued that intentions “are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much an effort they are planning to exert, to perform the behavior” [p. 181]. In TPB, three key attributes predict behavioral intentions, which are then assumed to be a strong predictor of ensuing behavior; Table 3.2 summarizes these dimensions.

The first is “attitude toward the act,” which is the degree to which the individual positively or negatively values performing the behavior or is committed to acting compared to other alternatives. Attitude is determined by behavioral beliefs, which include the anticipated outcomes of the behavior and the subjective evaluations of those outcomes. The second attribute is “subjective norms,” which refers to the perceived social pressure to engage (or not) in the behavior. Normative beliefs influence subjective norms. The third attribute, called “perceived behavioral control,” refers to perceptions of the ability to perform a given behavior. It is determined by control beliefs, which are perceptions about factors that may facilitate or impede the performance of the behavior and the perceived power of these factors. The latter construct largely overlaps with Bandura’s (1989) construct of perceived self-efficacy—that is, the perception that one can control the target behavior. The relative

Table 3.2: Main dimensions examined in the TPB

Dimensions	Definition
Attitude toward the act	This refers to the degree to which a person has a favorable or unfavorable evaluation of the behavior of interest. It entails a consideration of the outcomes of performing the behavior.
Subjective norms	This refers to the belief that most people approve or disapprove of the behavior. It relates to a person's beliefs about whether peers and people of importance to the person think they should engage in the behavior.
Perceived behavioral control (PBC)	This refers to a person's perception of the ease or difficulty of performing the behavior of interest. PBC varies across situations and actions, which results in a person having varying perceptions of behavioral control depending on the situation. PBC largely overlaps with self-efficacy from SCT.
Intention	This refers to the motivational factors that influence a given behavior, where the stronger the intention to perform the behavior, the more likely the behavior will be performed.

contribution of these three variables to intention varies across behaviors and situations and the specific intention under investigation (Ajzen, 1991).

The TPB suggests that when individuals have a positive attitude and subjective perception regarding a behavior and a high level of perceived control over that behavior, their intention to engage in that specific behavior is likely to be stronger. Intentions capture the motivational factors that predict behavior and fully mediate the effects of attitude and perceived social norms in predicting future behavior, while perceived behavioral control may also moderate the intention–behavior relationship (Ajzen, 1991). Thus, intention is the only antecedent of

behavior in TPB. The predictive power of intentions has been examined across a range of behaviors. For example, Ajzen (1987) showed that intentions explain, on average, 30% of behavior, while a meta-analysis conducted by Armitage and Conner (2001) found that TPB explained 22% of behavior. Summarizing the results of 10 meta-analyses that collectively investigate a wide variety of human behaviors, Sheeran (2002) reported that intentions explained 28% of the variance in behavior, leaving 72% of behavioral variance unexplained. Importantly, effect sizes are inconsistent across contexts, which speaks to the existence of moderators (Sheeran, 2002). Moreover, individual differences affect the strength of the relationship. The ability to exercise control over their actions or willpower to attain what they desire varies across individuals (Ajzen, 1985; Gollwitzer, 2001).

The application of TPB to entrepreneurship and gender provides a framework for understanding the complex interplay between individual beliefs, social norms, and structural barriers that shape entrepreneurial behavior. Cultural society, which is made up of attitudes, values, and norms (North, 1990) that reinforce some personal characteristics and penalize others, plays a critical role in entrepreneurial behavior (Díaz-García and Jiménez-Moreno, 2010). In such a system, gender beliefs—in which masculine traits are privileged over feminine ones—affect the entrepreneurial process and might explain why women perceive themselves less favorably than men.

The EEM (Shapero and Sokol, 1982) is similar to the TPB in terms of predictive power (Schlaegel and Koenig, 2014) and converges on the basic premise that intention to act is the best predictor of engaging in entrepreneurial behavior (Lee *et al.*, 2011). As a general psychological theory applicable to and validated across a range of human behaviors, TPB has dominated recent entrepreneurial intentions research (e.g., Schlaegel and Koenig, 2014), including studies devoted to researching and understanding gender differences.

3.3 Action

With regard to faculty entrepreneurial action, the contextual explanation that women are underrepresented in science (Larivière *et al.*, 2013), in

academia in general, and in fields such as agricultural sciences, medical sciences, engineering and technology, and natural sciences in particular (Rosa and Dawson, 2006), as well as in those positions from which faculty typically engage in entrepreneurial activity (Stephan and El-Ganainy, 2007) is the most plausible.

Although it is a major factor, it is not the only reason, as the proportion of women engaged in entrepreneurial activities is far lower (Rosa and Dawson, 2006). The gender gap in the broader literature on entrepreneurship, which broadly applies to academic entrepreneurship, has been clarified so far through the supply-side and demand-side perspectives (Ding *et al.*, 2013; Halilem *et al.*, 2022); see Table 3.3.

The supply-side perspective, developed in the fields of economics, argues that the differences in the preferences of men and women lead to different choices that, in turn, lead to gender gaps in labor markets. In contrast, the demand-side perspective, developed in sociology and social psychology, argues that women have limited opportunities to gain access to certain job types (Halilem *et al.*, 2022). Whereas the supply-side argument is vested in individual choices (Bertrand and Hallock, 2001), the demand-side argument outlines systemic biases (Gorman and Kmec, 2009).

The supply-side perspective encompasses gender differences in several aspects, such as attitudes toward risk, competition, the “selling of “science”, the type of research, and activities and in family responsibilities (Haeussler and Colyvas, 2011; Stephan and El-Ganainy, 2007). Women are more risk-averse than men and avoid engaging in risky activities (Haeussler and Colyvas, 2011; Stephan and El-Ganainy, 2007). As academic entrepreneurship implies a certain degree of tolerance for risk and uncertainty, as well as opportunity-seeking behavior (Ding and Choi, 2011), the traditional academic entrepreneur is male (Ding and Choi, 2011; Lauto *et al.*, 2022). According to Ding *et al.* (2013), women exhibit a lack of interest in conducting research with industry relevance. This can be linked to the evidence of so-called “gendered” studies and technological fields (Mayer and Rathmann, 2018; Puuska, 2010). The research fields preferred by female researchers are often different from those in which the entrepreneurship rates are higher, namely the STEM disciplines (Di Paola, 2021). Moreover, female academics

Table 3.3: Summary of the key dimensions in the main theoretical perspectives adopted in the study of entrepreneurial action and the presence of gender differences

Perspective	Key Dimensions
Supply side	<p>Risk-aversion: This refers to an individual's tendency to avoid risk. It hinders entrepreneurial action, and since women tend to be more risk-averse than men, women tend to undertake entrepreneurial action less than men.</p> <p>Preferences: This refers to choice of discipline as well as to commitment to certain activities. Women tend to prefer human and social sciences, which are fields in which entrepreneurship is less frequent. Women tend to dedicate themselves to teaching and administrative tasks, as well as to student mentorship and assistance. Therefore, they devote less time to research, which is one of the drivers of entrepreneurship. As a result, women are less engaged in entrepreneurial activities because of their career choices.</p> <p>Family responsibilities: This refers to the home and childcare. It is traditionally entrusted to women, who, in turn, experience more difficulty in undertaking entrepreneurship.</p> <p>Human capital endowment: Women tend to study human and social disciplines, in which entrepreneurship is less likely to occur. Women tend to have less industrial skill and experience than men, which are key enablers of entrepreneurship.</p> <p>Social capital endowment: Women tend to create smaller, more homogeneous networks (with other women and with other academics). Network size and diversification are relevant to entrepreneurship.</p>
Demand side	<p>Social discrimination: This refers to socially constructed and accepted beliefs that women are less valuable than men. Women are considered less trustworthy and less competent than men.</p> <p>Resource constraint: Women experience less availability of resources, especially financial, as women are considered less able to run a business than men.</p> <p>Hierarchical organization of the workplace: Women hold fewer senior positions, fewer leadership positions, and administer a lower amount of funding.</p>

tend to dedicate more hours to professional service than their male colleagues (Woolley, 2019) which could reduce the time available for engaging in entrepreneurial activities. Time constraints may also arise because female scientists tend to have more domestic responsibilities than their male colleagues; therefore, their personal costs (such as balancing schedules and childcare) for these activities are higher than for their male colleagues (Tartari and Salter, 2015).

Supply-side factors also include individual endowments in terms of human and social capital. HCT offers rationales both for the low number of women entering academic scientific careers in the first place,

as they are more likely to have failed to invest in the kind of education needed, and for the lower likelihood of being engaged in entrepreneurial activities once in science, as they are even less likely than their male counterparts to have acquired the needed entrepreneurial and industrial skills and experience. According to Rosa and Dawson (2006), the main difference in the human capital of academic entrepreneurs appears to be in their experience in business, higher-level administration, and management. The male founders of spinout businesses tended to be more experienced in these areas, whereas women tended to feel a lack of experience. The salience of business experience was also identified by Woolley (2019) and Whittington (2011). Along with human capital, social capital also matters, as women tend to form and use networks in a different way than men (Meng, 2016). Women are on the periphery in collaborative science spaces (Whittington, 2018); accordingly, they suffer from less visibility in scientific networks (Abreu and Grinevich, 2017). With regard to the fewer networks they create, female academics have more collaborators within academia (Bozeman and Gaughan, 2007), and they tend to include more women (and men include more men) in their collaborations. With specific reference to entrepreneurial activities, women are instead more likely to match with senior male colleagues (Lauto *et al.*, 2022; Rosa and Dawson, 2006). Collaboration with senior male colleagues is interpreted as a signal of women's competency.

On the other hand, the key arguments in relation to the demand side of the gender gap involve socially constructed cultural beliefs that act as disadvantages for women. Discrimination appears in different forms. First, there are inequalities of opportunity within the environment in which science is conducted and commercialized. Whittington and Smith-Doerr (2008) argued that the hierarchical structure of academia, compared to flatter organizations in small firms, amplifies gender disparities for science faculty over those in industry. Discrimination manifests at every career stage. Murray and Graham (2007) found that the opportunity structure in academic science excludes women in the early stages of their careers, which has long-lasting effects on their tendency to pursue commercializing their science. At the same time, women hold fewer senior-level positions (Bird, 2011), which prevents them from engaging in entrepreneurship as well. Empirical work, from economics

to organizational sociology to social studies of science, emphasizes that academics' tendency to commercialize research findings is conditioned by their position in the career and the reward structure of academic science (Stephan *et al.*, 2007). More established and productive faculty members are better positioned to reap the benefits of commercial opportunities and are therefore more likely to engage in technology transfer (Stuart and Ding, 2006; Bercovitz and Feldman, 2008). Therefore, having greater security of tenure and a stock of scientific and financial resources better situates scientists to mobilize their material and social capital for commercial gain (Grimaldi and Grandi, 2005; Levin and Stephan, 1991; Stuart and Ding, 2006). The significance of gender differences in commercial engagement suggests that academic entrepreneurship mirrors the existing, stratified structure of science (Haeussler and Colyvas, 2011).

These differences in structure and position make women's differential access to resources even more important for commercial engagement (Smith-Doerr, 2004). According to Tartari and Salter (2015), women scientists are likelier to have access to fewer resources and social support mechanisms than their male colleagues; they will have to spend more time and energy identifying useful resources and then exchanging them with industry partners. As a result, a lack of competency, the ability to perform (Ridgeway, 2001), and in-group membership (Stuart and Ding, 2006) are attributed to female academics by external actors. The overrepresentation of men among stakeholders and decision makers and fairly inflexible "men-oriented" organizational practices (Best *et al.*, 2017) forces women to involve senior male colleagues in entrepreneurial activities as founders (Rosa and Dawson, 2006). This reinforces the belief that both academia and entrepreneurship are masculine domains (Stephan and El-Ganainy, 2007) and perpetuates gendered habits for academic scientists (Karataş-Özkan and Chell, 2015). This is in line with the role congruity theory (Eagly *et al.*, 1992, 1995; Eagly and Karau, 2002) and lack-of-fit theory (Heilman, 1983, 2001), which argue that the disadvantages women face in the workforce arise from an incongruity between the qualifications for a position and characteristics that a female candidate is conventionally expected to possess. In addition, gender is used by evaluators to infer a candidate's competence (Berger

et al., 1972; Ridgeway and Erickson, 2000); this results in discrimination against female candidates.

To summarize, the gender gap is apparent at the intersections of supply-side and demand-side markets (Murray and Graham, 2007). Murray and Graham (2007) emphasized three interdependencies that are particularly salient. First, initial exclusion from opportunities in commercial science led to women's lower levels of professional socialization and skills in selling science. Second, exclusion and the limited activation of women's scientific networks for commercial opportunities meant that women were less able to resolve the ambiguities felt by all scientists in the early days of commercial science. Thus, their willingness and ability to sell were more limited. Third, much greater rates of male participation in the early days of commercial science caused the commercial role to be constructed as male, leaving women less skilled, disaffected, and more likely to self-assess as having low competence in commercial science than their male colleagues.

4

Narrative Review Method and the Proposed Framework of Analysis

The literature review in this study was carried out using a narrative methodological approach. A narrative review synthesizes existing studies on a specific topic, aiming to assess their conceptualization and the research methods employed (Petticrew and Roberts, 2008). Given the broad scope of our analysis, narrative reviews are particularly helpful in providing clearer guidance through the literature and in defining a coherent theoretical framework. Our main objective was to frame the research within selected dimensions that characterize the research corpus rather than to present statistical data for the entire body of literature. As discussed in the previous section, the entrepreneurial process is usually schematized along three phases: “mindset,” “intention,” and “action.” Thus, our framework considered them the elements of the first dimension of analysis. Since we were interested in the academic environment, our second dimension focused on the key subjects involved in the development of entrepreneurial activities: students, faculty, and the broader organizational context.

For studies to be included, they had to therefore investigate the gender perspective in one of the entrepreneurial stages with respect to the academic environment. The set of examined publications contained

articles with which we were already familiar and additional research products that were identified either following relevant backward and forward citations or querying the Scopus database.¹ To avoid missing important pieces of knowledge, we searched the main text fields (i.e., title, abstract, and keywords) of the publications in Scopus. First, we focused on the presence of terms referring to “entrepreneurship” and “academy” (e.g., “entrepren*” and “faculty” or “students” or “academ*”), along with gender-related concepts. We then expanded the search to include other dimensions and outcomes commonly associated with entrepreneurship (e.g., leadership, patenting, and startups).

A total of 102 articles were considered relevant and incorporated into the framework, as shown in Table 4.1. Articles were included in the “mindset” group when they directly mentioned it and focused on either the evaluation of the factors favoring its development or the assessment of the impact the mindset can have on entrepreneurial activities. In some cases, personality traits were investigated in relation to intentions or specific actions; however, the research focus was on the characteristics of the mindset. These studies directly or indirectly referred to experiences that connote a mind/psychological response in individuals or groups of subjects. Studies in the “intention” cluster addressed the individual’s willingness to begin an entrepreneurial endeavor. They directly mentioned the “intention” component and framed it in one of the theories that denotes mind/psychological traits to study drivers and their subsequent impact. Some of the articles included mindset as a covariate. The “action” group included articles focusing on factors that impacted the final entrepreneurial outcome (in terms of the quantity or success of the endeavor) and that were less interested in their relationship with the mindset or the intentions, which could be included as control variables. For example, parenthood or social capital are related to the available time and resources to pursue the implementation of entrepreneurial activities (e.g., new firm creation, patenting, etc.).

Before examining each subset of the proposed framework in detail, we provided some basic statistics on the identified corpus of literature. These statistics are useful in understanding some of the macro differences

¹Scopus is an extensive repository of scientific articles (www.scopus.com).

Table 4.1: Number of articles identified in each phase of the entrepreneurial process (rows) and for each of the subjects in the academic setting (columns)

Entrepreneurial Process				
Phase/Subject	Students	Faculty	Context	Total
Mindset	24	4	9	32
Intention	29	4	18	46
Action	7	23	18	35
Total	51	28	42	102

across the examined dimensions. Of the total sample, 39% were published between 2005 and 2014, while 61% were published from 2015 to April 2024. We argued that this time window provided a good balance to provide the most recent literature, without losing important building blocks.²

Based on the affiliations of the authors, the surveyed research was carried out mostly in the US (36 publications) and Europe (54); among the latter, the most represented countries were the UK (14), Spain (11), Italy (7), and France (6). Twenty-one studies had authors affiliated with institutions in Asian countries. Notably, almost all of them were from the Middle East, while countries such as China (2) and Singapore (1) are poorly represented (Japan and the Republic of Korea were not present), despite the general growing trend in almost every discipline observed in these nations. Two articles had authors affiliated with organizations in Central America and Africa, respectively.

Scopus provided a classification of the subject areas for the publication outlets. Studies in our framework were mainly in the field of business, management, and accounting (88); other relevant areas were the social sciences (40) and economics, econometrics, and finance (33).

With respect to the entrepreneurial phases that characterized our framework of analysis, the most represented was “intention” (45% of the sample), followed by “action” (34%) and “mindset” (31%). Eleven

²Please note that our narrative review approach did not aim to cover each and every publication but to propose a framework of analysis. Before 2005, only a very small group of articles addressed the entrepreneurial process in academia (“students”) and the gender variable; however, this was never the focus of the studies but a side feature (e.g., Krueger *et al.*, 2000; Hansemark, 1998; Chen *et al.*, 1998).

studies were categorized into more than one cluster, since they addressed multiple phases of the entrepreneurial process. The “mindset” and “intention” dimensions were addressed jointly in eight works, “mindset” and “action” in two, and finally, “intention” and “action” in one. The “mindset” and “action” phases of the entrepreneurial process were addressed in 32 and 35 articles, respectively. Both groups included articles that were equally distributed between 2005 and 2024. The “intention” phase not only appeared to be the most studied, but also seemed to be gaining momentum; almost three-quarters of the 46 examined articles were published in the last ten years.

Scholarly works approaching the entrepreneurial process among university “students” and highlighting gender-specific issues comprised the majority of our sample (51). This group of subjects was addressed in particular in the last five years (39% of the articles in the cluster). Most of these publications focus on the “mindset” and the “intention” phases rather than on “action.” The “faculty” group was smaller (28 articles) than the “student” cluster and appeared equally distributed in the time frame under consideration. The “action” phase of the entrepreneurial process was the most investigated (82% of the cluster). The “context” group included 42 studies and seemed to receive increasing attention between 2005 and 2024. In this group, the “mindset” phase was the least investigated, having half the number of articles compared to each of the other two phases.

The examined body of literature was also categorized according to the main methodological approach adopted by the studies. The sample included two literature reviews (Hmieleski and Powell, 2018; Stephan and El-Ganainy, 2007); the remaining publications were grouped into two types of empirical analyses:

- Qualitative analyses (11 publications in the sample) either collected nonnumerical data to understand concepts and theories or provided basic statistics from relatively small experimental samples. They involved case studies, interviews, analyses of reports, etc.
- Quantitative analyses (89) relied on the collection of data or employed statistical methods to test hypotheses or answer research

questions. They involved data from surveys or secondary data sources to quantify patterns, test theories, or evaluate interventions.

No ad hoc theoretical-only publications that exclusively focused on developing, exploring, or testing theories with no empirical support were found; however, most of the identified works drew from psychological, sociological, and/or entrepreneurial conceptual models to frame their research setting and theoretical support.

Across the entrepreneurial phases, the qualitative approach was relatively more present in the “mindset” (16% of cases) and “action” (14%) groups than in the “intention” (7%) group. In terms of studied subjects, the qualitative method was used slightly more in the “context” (14%) and “students” groups (12%), while it was marginal for “faculty” (7%).

To further qualify the scientific products, we tagged them according to the data source employed in their analyses: (i) mainly primary data, i.e., interviews or surveys (76% of the sample); (ii) mainly secondary data, e.g., personal and administrative information, company data, patenting activities (20%), or an equal combination of both (4%). The different entrepreneurial phases were, by nature, more conducive to either primary or secondary data sources. The “intention” phase aimed to examine individual-level characteristics that are not usually recorded in administrative or commercial databases and thus require the creation of an ad hoc dataset through surveys or interviews; hence, 100% of the publications in the “intention” group employ primary data sources. Similarly, research in the “mindset” phase is mostly from primary data (primary data only or in combination with secondary data accounted for 94%). In contrast, the “action” group comprised mixed approaches (40% primary, 51% secondary, and three publications with both types), since datasets on patenting activities, administrative, or company information can be exploited.

In terms of subjects, the “student” group relied extensively on primary data (96%), as they were focused on “mindset” or “intention.” The analyses of the “faculty” group showed they were of mixed types: 40% relied on primary sources, 46% on secondary sources, and 14% on a combination of both data types. A slightly less varied pool of resources could be found for the research focusing on “context” (67% primary,

26% secondary, 7% both types). With regard to trends, we highlighted an increase in the use of primary sources rather than secondary sources, especially in the last five years.

5

Theories for Female Academic Entrepreneurship

In this section, we illustrate the main contributions within academic entrepreneurship literature that adopt gender theories as the main focus.

We maintain the distinction between the three entrepreneurial phases: “mindset,” “intention,” and “action.” In each phase, we highlight the studies referring to student and faculty entrepreneurship, and to the role of context in shaping academic entrepreneurship.

5.1 Mindset

5.1.1 Student Entrepreneurship

The literature included in the “mindset” group examined the relationship between personality, psychological and motivational traits, and entrepreneurship among university students. Table 5.1 provides a summary of the reviewed papers associated with the main theories of entrepreneurial mindset, focusing on university students. The articles were divided according to the employed perspective on gender: the essentialist view of gender, which sees biological sex and gender identity as overlapping concepts, or the constructionist view of gender, which

Table 5.1: Articles on student entrepreneurship (mindset) classified by theoretical perspective

Theory	Gender as Sex (Essentialist View)	Gender as Socially Constructed
EO	Adeniyi <i>et al.</i> (2024) and Marques <i>et al.</i> (2018); Petridou <i>et al.</i> (2009) and Sánchez Cañizares and Fuentes García (2010)	Goktan and Gupta (2015)
Big Five	Hossain <i>et al.</i> (2024) and Laouiti <i>et al.</i> (2022); Murugesan and Jayavelu (2017) and Pandey <i>et al.</i> (2023)	“
HCT		de Los Dolores González and Husted (2011) and DeTienne and Chandler (2007)
ESE	Wilson <i>et al.</i> (2007)	Duval-Couetil <i>et al.</i> (2014) and Mueller and Dato-On (2013); Mueller and Dato-On (2008)
Push-and-pull motivation	Cho <i>et al.</i> (2019) and Lladós-Masllorens and Ruiz-Dotras (2022); Smith <i>et al.</i> (2020)	Almobaireek and Manolova (2013)
Other theories	Arshad <i>et al.</i> (2021) and Laudano <i>et al.</i> (2019); Malach-Pines and Schwartz (2008) and Sitaridis and Kitsios (2019)	

considers gender identity as socially constructed and different from biological sex.

There is little consensus on the role and extent of gender differences in the entrepreneurial mindset. One branch of the literature pertains to the individual entrepreneurial orientation (IEO) theory, which associates entrepreneurial tendencies and success with three main characteristics: proactivity, risk-taking, and innovativeness. Most of the examined literature explored the link between these characteristics and students’ gender without a theoretical framework for conceptualizing gender, often conflating the concepts of gender and biological sex. Some of these studies suggest that female students demonstrate greater proactivity (Adeniyi

et al., 2024; Marques *et al.*, 2018) or a generally more positive attitude toward entrepreneurial activities (Petridou *et al.*, 2009). Specifically, Adeniyi *et al.* (2024) investigated the influence of IEO and gender on entrepreneurial readiness, i.e., the cognitive attributes of capability and willingness to engage in entrepreneurial activities. Through a survey of 289 final-year students from three science and technology colleges in Nigeria, they found that women exhibited greater proactivity than men, which was significantly associated with higher entrepreneurial readiness.

Marques *et al.* (2018) expanded their study to include two additional dimensions of IEO: autonomy and aggressiveness. They conducted an online survey with 358 Portuguese students from various academic programs to assess the impact of entrepreneurship education (EE) on IEO. Although their primary focus was on the effects of pursuing an EE pathway, their findings revealed that, regardless of the EE factor, women demonstrated greater proactivity compared to their male peers. In another study, Petridou *et al.* (2009), while not referencing IEO theory directly in their literature review, attempted to measure gender differences by considering some of the categories associated with IEO, such as risk-taking and proactivity. By surveying 1,639 students from various scientific disciplines at two Greek universities, they found that women exhibited a greater interest in acquiring knowledge, developing skills, facing career competition, and networking with local businesses.

While Sánchez Cañizares and Fuentes García (2010) also did not mention a specific theory in their framework, they focused on gender differences in risk-taking. They administered a questionnaire to 1400 students at the University of Cordoba and revealed that women exhibit lower levels of risk-taking propensity and are likelier to perceive the fear of failure as a barrier to starting a business.

Goktan and Gupta (2015) used the theory in combination with a constructionist perspective on gender and sex, distinguishing between biological characteristics (being male or female) and gender identity, which includes identification with masculinity, femininity, androgyny (high levels of both masculinity and femininity), or having an undifferentiated gender identity. They argued that although the entrepreneurship literature often emphasizes the relationship between male or female individuals and these traits, the reality may be more complex. Their

analysis was based on data from undergraduate business students in four countries. While their findings revealed that male students exhibited significantly higher levels of IEO than female students based on biological sex, they also found that androgynous identity had the greatest positive effect on IEO. Undifferentiated, masculine, and feminine orientations contributed less to IEO compared to androgynous identity. Importantly, this pattern was consistent across all countries studied.

In the “mindset” group of studies, we also included those works that employ the Big Five theory to examine gender differences in entrepreneurial intentions (EI). Although these articles could potentially be assigned to the “intention” cluster, we preferred to allocate them here, as the focus of their findings was more on the personality traits and their influence on the entrepreneurial process and mindset. Murugesan and Jayavelu (2017) conducted a survey of 248 students enrolled in a technical program during the 2008–2009 academic year at the National Institute of Technology, Tiruchirappalli (Southern India). Their findings indicated that female students, while more agreeable, extroverted, and conscientious, scored significantly higher in the neuroticism dimension compared to men. This suggests that women tend to experience higher levels of tension and worry. Additionally, the study found that individuals who are exceptionally open or conscientious, as well as highly agreeable and neurotic, are more likely to develop stronger entrepreneurial intentions.

Laouiti *et al.* (2022) conducted an online survey of 531 students from a business school in France and utilized fuzzy-set qualitative comparative analysis, a technique based on Boolean algebra that identifies combinations of conditions sufficient to predict an outcome. Their study explored the relationship between the Big Five personality traits and entrepreneurial intention from a gender perspective. The analysis revealed four potential student profiles associated with high EI. The two gender-neutral profiles were characterized by high emotional stability (low neuroticism) and high openness to experience, with high agreeableness. The first universal profile also included high extraversion, while the second included high conscientiousness. The third profile, primarily observed in women, involved high openness to experience, high conscientiousness, and high agreeableness, with low extraversion

as a core condition. The fourth profile, mainly exhibited by men, included high openness to experience, high conscientiousness, and high agreeableness, but with high extraversion. The findings indicated that there was no evidence suggesting that women need low neuroticism and low agreeableness to develop high EI.

A branch of the literature that deals with the Big Five theory and gender differences in the entrepreneurial process among university students specifically focused on social entrepreneurship. Hossain *et al.* (2024) surveyed 354 business students from two universities in Bangladesh to examine the relationship between gender, personality traits, social self-efficacy (defined as the ability to engage and maintain interpersonal relationships in an individual's social and career lives), and social entrepreneurial intentions (SEI). They found that extraversion and emotional stability were not moderated by gender. However, women reported higher levels of conscientiousness and openness with regard to SEI compared to their male peers, while men reported higher levels of agreeableness and social self-efficacy. Pandey *et al.* (2023) conducted a survey of 385 management students from Tribhuvan University to assess the impact of personality traits and social support on SEI, with a focus on the moderating role of gender. They found that gender did not influence the relationship between any of the Big Five personality traits and SEI. Both papers discovered that gender moderates the relationship between social support and SEI.

DeTienne and Chandler (2007) and de Los Dolores González and Husted (2011) both used HCT to investigate the role of gender in opportunity identification among students. The first study combined HCT and social feminism theory, which posits that differences between women and men are due to unique socialization processes. It involved an experiment with 95 students in the western U.S. Participants were asked to recall their activities and events over the preceding 24 hours, which could include commuting, social encounters, classes, homework, hobbies, work, family responsibilities, or involvement in organizations. They were then instructed to list any business opportunities they had observed during this time, without the need to critically evaluate their potential success. The study found that, among women, there was a positive relationship between the amount of previous experience in the retail

industry and the number of opportunities identified. In contrast, among men, there was a positive correlation between the number of previous entrepreneurial ventures in which they had been involved and the number of opportunities identified. These findings suggest that women and men utilize different types of human capital to identify opportunities. Nonetheless, there was no gender difference in the innovativeness of the identified opportunities. de Los Dolores González and Husted (2011) used the same theories to conduct a survey among 174 MBA students at a university in northeastern Mexico. They discovered that, when considering similar levels of human capital, men and women did not show significant differences in the number or innovativeness of opportunities identified. However, the study did not investigate whether male and female students utilized different types of human capital or opportunity identification processes.

These contributions suggest that differences in entrepreneurial mindset among female students may be associated less with actual entrepreneurial orientation and personality traits, and influenced more by gender stereotypes. This interpretation is supported by literature that considers the impact of gender stereotypes on the development of an entrepreneurial mindset among students. Research suggests that female students are more likely to perceive greater barriers to entrepreneurship and lower levels of entrepreneurial competence for themselves. This is attributed to the gendered perception of entrepreneurship as primarily masculine (Shinnar *et al.*, 2012). Consequently, students who see themselves as more similar to males (male gender identification) are those who have higher entrepreneurial intentions. In another study, Menzies and Tatroff (2006) surveyed 215 students at Brock University in Ontario and found that women did not perceive entrepreneurship as fitting their personality, although no gender differences were detected in the risk-taking aspects of entrepreneurship. Gupta *et al.* (2009) collected and analyzed the data from a survey administered to more than 700 respondents from the US, India, and Turkey. They found that female students more frequently described entrepreneurs as possessing attributes that are both masculine and feminine, whereas male students predominantly associated entrepreneurial attributes only with masculinity. In this stream of research, Mueller and Dato-On (2013) suggested that

the traditional view of the “entrepreneur as a man” might be fading in some national or cultural settings (see Section 5.1.3 for further details on the role of context).

Another body of literature exploring the entrepreneurial mindset among students utilizes SCCT to examine gender differences in ESE. In a study by Wilson *et al.* (2007), female students consistently exhibited significantly lower ESE levels compared to their male counterparts across various life and academic career stages, even after gaining admission to top-ranked schools and historically male-dominated domains. This finding aligns with other literature that, while not focusing exclusively on students, has also demonstrated gender differences in ESE. However, Mueller and Dato-On (2008) found no statistically significant differences in ESE levels across genders. Yet, they discovered that individuals with stereotypically masculine or androgynous orientations tend to have higher ESE levels for certain entrepreneurial tasks. Women, however, are less likely to exhibit masculine or androgynous orientations. Subsequent research revealed that this relationship is strongly influenced by the cultural landscape and its interaction with gender role stereotypes (Mueller and Dato-On, 2013), as also seen in the literature that is more focused on personality traits.

Even without explicitly referring to SCCT, Duval-Couetil *et al.* (2014) measured gender differences in ESE by gathering survey data on 2,664 students enrolled in a multidisciplinary entrepreneurship course at a prominent university in the US over a period of five years. They discovered that not only did male students express a greater interest in becoming entrepreneurs, but they also rated their abilities higher than female students in all areas closely associated with entrepreneurship. On the other hand, women were more confident in areas that were not directly related to entrepreneurship, such as advertising, promotion, and sales. This discrepancy probably reflects socially constructed gender career stereotypes, according to which entrepreneurship is still viewed as a masculine career path.

A unique study in literature was conducted by Malach-Pines and Schwartz (2008). This study integrated Schneider’s attraction–selection–attrition (ASA) model and the person–organization (P–O) fit theory. The ASA model suggests that organizations become homogeneous over

time as individuals with similar characteristics are attracted to, selected by, and remain within these organizations. The P–O fit theory emphasizes the compatibility between individuals and organizational characteristics. As part of a broader study, Malach-Pines and Schwartz assessed gender differences in the entrepreneurial propensity of 313 Israeli management students through an online questionnaire. They found that men tended to perceive themselves more favorably as entrepreneurs than women. However, among management students who either own a business or plan to start one, the gender differences in self-perceived entrepreneurial traits, reasons, and conditions for starting a business nearly disappear. Additionally, no gender differences were found in business-related characteristics, such as business and economic knowledge. This suggests that women's reluctance to pursue entrepreneurship as a career may stem from lower self-confidence.

Regarding motivational factors, studies have frequently utilized the framework of push and pull motivation. This framework posits that individuals may either be pushed into entrepreneurship by necessity or pulled by opportunities, such as the desire for financial gain or social recognition. Almobaireek and Manolova (2013) conducted a survey among 856 undergraduate students at King Saud University. They found that female students were more likely than males to start an entrepreneurial venture out of necessity and achieve independence, although they did not believe that entrepreneurship would lead to social recognition, achievement, or the realization of a vision. Men were more likely to be motivated by financial success, although financial success was identified as the primary motivation by both genders. In addition, male students exhibited a broader range of entrepreneurial motivations compared to women. Cho *et al.* (2019) conducted focus group interviews with Latina women aged 20–30, primarily college students from US universities, who expressed interest in starting their own businesses in the near future. The majority of respondents were motivated to start a business by having a family member who ran their own business, drawing inspiration from their parents' business success. Autonomy, defined as becoming one's own boss and enjoying personal independence, freedom, and flexibility in time management, was the next significant motivator. Participants also cited increased, flexible, or additional income as a

motivation, as they hoped for financial security. Self-fulfillment was another motivator mentioned.

However, the participants identified fear of failure and lack of self-confidence as significant barriers to starting a business, aligning with previous findings on personality traits and ESE. Similar results were found by Smith *et al.* (2020), who surveyed 247 computer students from two universities, one in Australia and one in the UK. They found that female students rated job flexibility as a significantly higher motivator for an entrepreneurial career than males did, with minimal differences between the two countries. However, barriers to entrepreneurship, such as lack of confidence, lack of contacts and resources, and lack of leadership and creativity skills, were much more impactful for women. Women also placed higher importance on idea generation support, such as academic support, access to incubators, opportunities to brainstorm, education and training, and family encouragement and support.

In their study on the influence of financial skills on entrepreneurial motivation, Lladós-Masllorens and Ruiz-Dotras (2022) conducted a cluster analysis of survey data from 205 female students and recent graduates from the Universitat Oberta de Catalunya, Spain. They identified four distinct clusters of female entrepreneurs based on their motivators. The first cluster included women motivated by business opportunities or the need for professional autonomy and personal achievement. This group mostly comprised older respondents with well-paid jobs and advanced financial skills. The second cluster comprised women motivated by economic necessity and personal growth. These women typically had high self-confidence despite their limited financial skills. The third cluster included younger women driven by the necessity of escaping poor labor conditions. The fourth cluster was related to social entrepreneurship and the desire to contribute to community welfare; however, the small number of observations in this group did not allow for precise conclusions.

Overall, personal motivations, such as dissatisfaction with current occupations, the desire for autonomy, and the wish to make a societal impact, were the most significant drivers for women, in line with the literature. In another study, Arshad *et al.* (2021) applied the goal content theory framework to survey 380 final-year business students

at Pakistan's largest university. Their findings confirmed that women are more driven toward entrepreneurship for communal purposes, such as helping others or contributing to a better society, whereas men are more influenced by potential financial gain and intrinsic interests related to the entrepreneurial activity itself. Laudano *et al.* (2019) found that the need for independence and achievement were significant motivators for female students in Italy and Albania, respectively. The need for independence reflected a desire for personal responsibility in decision making and the acquisition of self-esteem, while the need for achievement pertained to aspirations to occupy social positions that fulfill self-identity expectations.

However, Sitaridis and Kitsios (2019) found contrasting results. Using the TPB to examine gender and background differences in entrepreneurial intention among students, they surveyed 162 Greek graduate and postgraduate students in the field of IT. Their study revealed that men and women had similar perceptions of barriers, such as lack of entrepreneurial experience, knowledge and skills, time constraints and risk taking, and self-motivation. This led to the conclusion that entrepreneurial barriers and motives alone cannot adequately explain the different levels of entrepreneurial intention between genders.

5.1.2 Faculty Entrepreneurship

The contributions to the gendered dimensions of the entrepreneurial mindset tested on university faculty were significantly lower than those on students. Hence, some of the prominent theories applied to students (see the previous section) were also adopted by professors and researchers, with the addition of specific theoretical perspectives. Table 5.2 provides a summary of the reviewed papers associated with the main theories of the entrepreneurial mindset focusing on university faculty. The articles were divided according to the employed perspective on gender: gender as sex (essentialist view) or gender as socially constructed.

Abidi *et al.* (2022) applied the EO theory combined with the concept of individual intrapreneurship, which encompasses various subconstructs reflecting EO dimensions. They investigated the correlation between the three individual dimensions of EO (innovativeness, risk taking, and

Table 5.2: Articles on faculty entrepreneurship (mindset) classified by theoretical perspective

Theory	Gender as Sex (Essentialist View)	Gender as Socially Constructed
EO	Abidi <i>et al.</i> (2022)	
HCT		Rosa and Dawson (2006)
Push-and-pull motivation		Rosa and Dawson (2006)
Other theories	Abreu and Grinevich (2017) and Fox and Xiao (2013)	

proactivity) and faculty characteristics, particularly gender. Utilizing survey data from 291 faculty members in engineering and business faculties at private and public universities in Kuwait, they found that male faculty members exhibit higher levels of risk-taking behavior and innovativeness compared to their female counterparts. Conversely, female faculty members were found to be more proactive, especially in identifying long-term threats and opportunities for their institutions. These findings align with the previously analyzed literature on students.

Rosa and Dawson (2006) achieved somewhat different results. Using a perspective that combined HCT, sociological gender theory, and push-and-pull motivational factors, they conducted a mixed-method study incorporating statistical data, surveys, and interviews. They sent a postal questionnaire to the academic founders of companies from British universities and conducted pilot interviews with four female academic scientists from the University of Stirling. The survey revealed that while both genders generally view academic spinout activity as a natural extension of their research, women are more often motivated by pull factors—being drawn to academic entrepreneurship by others' influence or the context of an entrepreneurial university. The findings suggest that when commercialization arises from external demand rather than individual intrapreneurial drive, women are just as likely to respond to the challenge, provided they are in positions of seniority—a status still relatively rare for women in leading science departments.

Other studies have investigated gender differences in individual characteristics and inclinations related to developing an entrepreneurial

mindset without adhering to a specific theoretical framework. Fox and Xiao (2013) conducted a web-based survey of 170 female associate professors of computing at institutions that are members of the Computing Research Association in the US and Canada. Their results supported Rosa and Dawson's (2006) findings. They found that women perceive status and rewards in their departments and fields as being governed by traditional scientific and academic criteria, leading them to believe that academic entrepreneurship is not central to career progression. However, the female faculty members interviewed indicated that they would be more involved in entrepreneurship if it were tied to rewards of salary and status, supporting the thesis that women are more often motivated by pull factors. Abreu and Grinevich (2017) examined gender patterns in faculty entrepreneurial action using survey data from 22,556 UK academics. They investigated gender differences in psychological and ethical stances on academic entrepreneurship and found that women were more ambivalent about universities prioritizing industry needs at the expense of core teaching and research roles, whereas men had stronger opinions either for or against this issue. In addition, female academics were more likely to state that their research was relevant to noncommercial organizations, which may be linked to a tendency among women to focus on social and communal goals.

5.1.3 Context

Contextual factors impacting gender differences in the academic entrepreneurial mindset are often analyzed in relation to more individually focused research, as discussed above. This section aims to isolate and independently analyze how context can shape the academic entrepreneurial mindset in terms of gender, according to the literature. Table 5.3 reports the main articles reviewed in the mindset cluster dealing with the context. The studies can be categorized into two groups according to their focus on the organizational or the cultural/national dimension of analysis.

The gender gap in academic entrepreneurship can also be influenced by the hegemonic masculine discourses surrounding entrepreneurship in general, which permeates universities and business courses as well.

Table 5.3: Articles on student and faculty entrepreneurship (mindset) classified by level of context

Organizational Level	Cultural or National Level
Fox and Xiao (2013), Jones (2015, 2014), Jones and Warhuus (2018) and Rosa and Dawson (2006)	Laudano <i>et al.</i> (2019) and Mueller and Dato-On (2013); Shinnar <i>et al.</i> (2012)

By adopting a social constructionist perspective of gender, Jones (2014) conducted a discourse analysis on a collection of policy and policy-related documents pertaining to entrepreneurship in higher education. Her analysis reveals that these documents predominantly depict the entrepreneur and the ideal student beneficiary of EE using fictive templates. These templates are more aligned with characteristics typically associated with white male students, who are seen as naturally possessing the desired behaviors and abilities. This characterization is reinforced by the symbolic association between entrepreneurship and masculinity. Consequently, female students and male students who do not conform to this masculine ideal may find it challenging to identify with the gendered discourses prevalent in these documents. Therefore, the issue lies not in inherent personality traits but in how the university context shapes the ideal entrepreneurial mindset within a gendered framework (Jones and Warhuus, 2018). This suggests that the widely accepted masculine construct of entrepreneurship may hinder female students' entrepreneurial aspirations, not because they cannot identify themselves as entrepreneurs but because feminine characteristics and women are not associated with entrepreneurship; this is often a subtle but unquestionable phenomenon (Jones, 2015).

The literature on gender differences among faculty suggests that the entrepreneurial orientation of a university or department can differentially impact men and women in developing motivation for academic entrepreneurship. For example, Fox and Xiao (2013) found that women believed they would be more involved in academic entrepreneurial activities if these activities were tied to the promotion and improvement of their academic status. This finding indicates that a university's focus on the commercialization of research could enhance an entrepreneurial

mindset and motivation among female faculty. However, the specific context of universities and departments can be detrimental to women's entrepreneurial motivation, especially when their surroundings are perceived as unsupportive and distant. In Rosa and Dawson (2006), women specifically highlighted the inadequacies of their business advisors and university TTOs as obstacles to their academic entrepreneurship activities. The authors attributed this to the disadvantages women face in building social networks. The need to balance family and work responsibilities, which often falls primarily on women, along with their historical isolation in male-dominated fields such as science, are frequently cited as reasons why women may not take the same steps as their colleagues in developing valuable contacts and networks.

Significant differences in students' entrepreneurial mindsets and intentions have been observed in comparisons of national and cultural contexts, both intersecting with gender and extending beyond it. For example, significant differences can arise between Western and non-Western countries, or based on the economic situation and growth of different national contexts. Shinnar *et al.* (2012) specifically examined the intersecting roles of gender and culture by comparing the entrepreneurial perceptions of students from the US, Belgium, and China. One of the most notable findings was that in the US and Belgium, women perceived fear of failure and lack of competency as more significant barriers to entrepreneurship than men did. However, this gender difference was not statistically significant in China. The authors suggested that this lack of gender difference in China might be related to the Chinese cultural value of "mianzi," i.e., saving face and preserving a good reputation at the family level. The Chinese one-child-per-family policy might have created gender-neutral expectations for both sons and daughters within the family, generating a gender-neutral tension toward adopting risk-taking behavior to maintain a good reputation. The authors also reported on the Chinese government's effort to equalize girls' educational opportunities and foster educational competition among all genders, which might account for the lack of significant gender differences in perceiving a lack of competency as a barrier to entrepreneurship careers.

On the other hand, Laudano *et al.* (2019) compared female students from the University of Florence, Italy, and the University of Shkodër, Albania, and found that Albanian students exhibited higher levels of entrepreneurial attitude and intent. According to the authors, this aligns with the argument that entrepreneurial intent is typically higher in emerging countries. The study also revealed significant differences in the factors influencing entrepreneurial attitudes. Specifically, the need for independence was a significant predictor for Italian students, whereas the need for achievement significantly influenced Albanian students. This was explained by the fact that Albania is experiencing economic recovery after a prolonged period of economic and political crises, which might have encouraged the younger generation of women to take entrepreneurial risks in pursuit of career status and self-realization.

Another factor that can influence gender differences in academic entrepreneurship is the variation between countries in terms of gender egalitarianism and adherence to traditional gender stereotypes; however, studies on this matter are either insufficient or have mixed results. Mueller and Dato-On (2013) compared Spain and the US, two countries similar in economic development but differing in cultural gender role orientation. They noted that Spain has a relatively low masculinity index, whereas the US has a relatively high masculinity index. Their findings showed that American male students were more likely to exhibit a masculine orientation and less likely to exhibit a feminine orientation, while Spanish male students were more likely to exhibit an androgynous orientation. American female students displayed heterogeneity in their gender role orientation, whereas Spanish female students showed a more stereotypically feminine orientation. Interestingly, in the US sample, high ESE levels were found among students with an androgynous orientation, with no differences among those with masculine or feminine orientations. In contrast, the Spanish sample showed the highest ESE among individuals with a masculine orientation. This suggests that traditional gender role stereotypes associated with entrepreneurship are more persistent in Spain than in the United States, despite cultural indexes.

5.1.4 Summary

Section 5.1 examines gender differences in the entrepreneurial mindset among university students and faculty. It highlights a prevalence of studies that show an essentialist view of gender or a focus on gender differences as related to personality traits. In these studies, women tend to show higher levels of proactivity, openness, and social contributions in entrepreneurship but face significant barriers, such as fear of failure, lower risk-taking tendencies, and limited confidence. Men, on the other hand, tend to score higher in entrepreneurial orientation, particularly when masculinity aligns with entrepreneurial traits.

When it comes to motivations among students, women often prioritize autonomy, flexibility, and social impact, while men are more driven by financial success and broader entrepreneurial ambitions. Moreover, females are more likely than males to start an entrepreneurial venture out of necessity.

A smaller branch of literature shows that contextual factors, such as organizational culture and national norms, play a crucial role. Masculine stereotypes within universities and business settings reinforce entrepreneurship as a male-dominated domain, limiting women's participation. However, in some contexts, such as emerging economies, women exhibit higher entrepreneurial intent, influenced by economic recovery and social expectations.

Faculty entrepreneurship reflects similar gendered patterns, with male faculty showing greater risk-taking and innovativeness, and female faculty demonstrating more proactivity. Differences in motivation suggest that external encouragement ("pull" factors) often drives women's entrepreneurial efforts, whereas men are more self-motivated.

Although the persistent stereotypes that frame entrepreneurship as masculine, impacting women's self-perception and confidence, exposure to entrepreneurship education can contribute to bridge certain gender gaps in the entrepreneurial mindset, though women may still perceive greater barriers.

Table 5.4: Articles on student entrepreneurship (intentions) classified by theoretical perspective

Theory	Papers
EI	Díaz-García and Jiménez-Moreno (2010) and Arshad <i>et al.</i> (2016), Passah and Panda (2022) and Datta <i>et al.</i> (2022), Maes <i>et al.</i> (2014), Vamvaka <i>et al.</i> (2020)
Gender theories	Mueller and Dato-On (2008), Perez-Quintana <i>et al.</i> (2017), Gupta <i>et al.</i> (2008)
Entrepreneurship education	Wilson <i>et al.</i> (2007) and Shinnar <i>et al.</i> (2014), Westhead and Solesvik (2016) and van Ewijk and Belghiti-Mahut (2019), Salavou <i>et al.</i> (2021), López-Delgado <i>et al.</i> (2019), Polin (2022)

5.2 Intention

5.2.1 Student Entrepreneurship

The focus on student entrepreneurship has been growing as students increasingly decide to embark on entrepreneurship during their studies or soon after graduation (Meoli *et al.*, 2020). Indeed, becoming an entrepreneur has become an attractive alternative to wage employment among students, and disentangling the differences across genders has become highly relevant. Moreover, there is increasing interest in why men and women differ in their entrepreneurial intentions. The selected articles were grouped along the main theories and constructs to support the explanation of gender differences among students in the formation of entrepreneurial intentions, as shown in Table 5.4.

A large group of studies have employed the TPB (Ajzen, 1991) and have tested the moderating or mediating effect of gender. As anticipated in some of the studies on mindset in the previous section, the

results highlight that self-efficacy, societal norms, and gender perceptions significantly influence entrepreneurial intentions, with masculine traits being more aligned with entrepreneurial intentions than feminine traits. Díaz-García and Jiménez-Moreno (2010) found support for the validity of the entrepreneurial intention model: subjective norms, entrepreneurial attitude, and self-efficacy have a significant relationship with entrepreneurial intention. The authors then considered the role of gender, not just evaluating gender as a demographic variable but theorizing the role of gender in the process of formation of entrepreneurial intentions. They showed that men are more likely to think about creating a firm than to be determined to do it and hypothesized that for women, perceptions of themselves and their environment play a greater role in their entrepreneurial intention. In particular, they argued that the culture of a society plays a critical role in determining entrepreneurial intentions (Passah and Panda, 2022).

Specifically, the gender-belief system sustains a hierarchical valuation in which masculine traits and characteristics are privileged over feminine ones. Such a view can, in part, explain why women are less likely to form entrepreneurial intentions because they perceive themselves and the entrepreneurial environment in a less favorable light than men. In addition, to better explore and explain gender differences in the entrepreneurial intention process, they included stereotyping in the model. The authors observed that both men and women with firm entrepreneurial intentions perceive successful entrepreneurs to have feminine attributes. These results may, together with the characteristics of the sample, explain the lack of a gender difference in entrepreneurial intention found in the paper.

Arshad *et al.* (2016) applied the TPB model by integrating the framework of the GST, which focuses on individuals' understanding of themselves (Bem, 1981). Occupation choice might be affected by gender schema, which may inhibit women's entrance into entrepreneurship. In this study, the authors examined the moderating effect of gender on the relationship of social norms and self-efficacy with attitude. The results revealed that self-efficacy and social norms positively affect individuals' entrepreneurial attitudes, which in turn determine EIs. However, these

effects are moderated by gender: males are more triggered by self-efficacy, and conversely, females are more influenced by social norms in the development of positive attitudes toward entrepreneurship.

Passah and Panda (2022) built on gender role orientation (GRO) and TPB to explain the differences in the formation of entrepreneurial intentions. GRO does not refer to the biological categories of male and female. It encompasses the individual's internalized sense of femininity or masculinity, which influences behaviors, attitudes, and self-concept (Spence, 1984). Passah and Panda (2022) looked at how the GRO might influence the antecedents of EI. The authors argued that entrepreneurship is not only characterized by masculine characteristics, but also some feminine characteristics (Mueller and Dato-On, 2008). As such, androgynous individuals who possess both feminine and masculine traits have higher entrepreneurial intentions than their masculine counterparts, while feminine individuals showed an insignificantly negative inclination toward entrepreneurship.

Datta *et al.* (2022) leveraged a concept similar to GRO that they called "gender role identity" (GRI) in combination with TPB to explain the difference in entrepreneurial intention among students. GRI is the product of social and cultural factors. It is the individual's self-perception of their gender, which differs from biological sex. The general stereotype suggests that the characteristics typically associated with entrepreneurship, such as assertiveness and willingness to take risks, are often perceived as more aligned with traits associated with masculinity than femininity (Amentie and Negash, 2015; Majumdar and Varadarajan, 2013). As such, exploring how entrepreneurial intention can be influenced by GRI provides a better understanding of entrepreneurship behavior, as both men and women may incorporate higher or lower levels of masculine and feminine characteristics into their self-identities and self-concept. The study revealed, in line with most of the literature, that the TPB is the appropriate model for measuring the relationships among attitude and behavior, social norms, personal behavioral control, gender role identity, and the formation of entrepreneurial intention of male and female students and assessing their effects. Moreover, the study showed that identifying with more feminine traits has a negative

effect on SSN—the support of important referent people—and in turn has a significant negative effect on the formation of intention.

Maes *et al.* (2014) aimed to better understand the differences between males and females in the formation of entrepreneurial intention by using the TPB, including a deeper-level measurement model that focuses not only on the factors defining intentions but also on the indicators that refer to people's beliefs and considerations. Their approach was aimed at exploring the antecedents and motives that affect women and men in entrepreneurial careers through entrepreneurial intentions. The study first showed the mediating role of personal attitude and perceived behavioral control in explaining the lower entrepreneurial intentions of women compared to men. In addition, it highlighted important and significant differences in the factors affecting entrepreneurial intention. First, in terms of career evaluation, women see entrepreneurship as a means of autonomy and balancing work and family status; conversely, men see a career more as a means to achieve high results and have a challenging job. In addition, women value personal capabilities and know-how as more important practical considerations in their decision to become entrepreneurs compared to men.

Similarly, Vamvaka *et al.* (2020) explored the elements of the TPB with respect to the presence of gender differences. The attitude construct comprises two components: the affective and the instrumental. The perceived behavioral control encompasses the perceived controllability and perceived self-efficacy factors. In doing so, the authors were better able to disentangle the antecedents of entrepreneurial intentions and distinguish where differences between males and females unfold. Their results suggested that significant, albeit weak, gender differences exist in some of the constructs involved in the TPB. In particular, their results showed that compared to their female counterparts, male students had higher levels of perceived self-efficacy and perceived controllability, but they found no differences in terms of attitude. Finally, the moderating effects of gender showed no differences between males and females; the exception was in the relationship between commitment to entrepreneurship and nascent entrepreneurship, which was found to be stronger in men than in women.

Joensuu *et al.* (2013) explored the development of entrepreneurial intentions over time and the differences in intention development among males and females. Leveraging the TPB and observing students over almost three years, the authors showed that entrepreneurial intentions seem to decrease over time. This was explained as the tendency of individuals to evaluate actions that are distant in time based on the positive aspects of the actions, while they tend to assess actions that are closer in time based on the negative aspects (cons) of the actions (Eyal *et al.*, 2004). The results demonstrated differences between males' and females' intentions to start a business: males have higher intentions at the start of their studies compared to females, and their level of intention does not diminish as much as the intentions of female students.

Finally, Haus *et al.* (2013) conducted a quantitative, systematic meta-analysis across studies to examine the relationship between gender and EI. Their results showed that males had higher entrepreneurial intentions compared to females. Moreover, testing Ajzen's model, women expressed lower-level attitudes, subjective norms, and perceptions of control toward starting a business.

A second important set of studies tested the TPB, with a focus on the effect of personal traits in the relationship between the formation of intentions and gender. In particular, such papers bring a psychological perspective to understanding why males are more likely to embark on entrepreneurship. Ward *et al.* (2019) analyzed the causal relationship between personality traits and entrepreneurship intention. In particular, the study analyzed how PBC and perceived entrepreneurial skills, as exogenous variables, affect entrepreneurial intention and how these are mediated by entrepreneurial motivations and risk-taking propensity. Their results confirmed that males have higher entrepreneurial intentions and show attitudinal variability by gender: male intentions are more influenced by personal confidence, while females are more driven by competencies. Dawson and Henley (2015) also accounted for the role of risk in the formation of entrepreneurial intentions. Another important body of research has shown that women, in general, may be more risk-averse than men (Byrnes *et al.*, 1999). As risk aversion is associated with entrepreneurship, it is relevant to assess how gender affects this relationship. Differences in attitudes toward risk can help

explain differences in students' levels of intention to start a new business. The results showed that a higher inclination toward risk taking plays a notable role in elucidating why men tend to exhibit significantly higher levels of entrepreneurial intention compared to women. Margaça *et al.*'s (2021) study, also based on the TPB, aimed to understand how entrepreneurial intentions differ between genders and how TPB dimensions are mediated by individuals' resilience and psychological well-being. The results showed that attitude is one of the main factors that influence females to become entrepreneurs. Psychological resilience was found to mediate a significant effect between perceived behavioral control and intention in females but not in males. Moreover, it also mediates a significant effect between attitude and intention in females, but not in males.

A recent stream of research has focused on understanding the different types of entrepreneurial intentions by distinguishing between social and general entrepreneurship. All the studies in this group were in agreement that women are more inclined toward social entrepreneurship, as their values align more closely with the principles of social entrepreneurship compared to other types of entrepreneurial intentions. This set of recent studies extended beyond defining entrepreneurial intention to examine the specific types of entrepreneurship individuals aim to pursue, with a particular focus on gender differences between males and females. These results may be very informative on how to attract and target women and men for entrepreneurial education activities. Donaldson *et al.* (2023) explored the entrepreneurial intentions of students, comparing the types of entrepreneurship that males and females aim to pursue. Scholars exploring entrepreneurial intentions have focused mainly on understanding the motivation that leads to traditional, commercialized forms of entrepreneurship and less on motivations, such as lifestyle or social causes. Donaldson *et al.* (2023) looked at the different motivations and ESE subdomains to assess the process by which gender differences may emerge. Their results showed that male students are more likely to pursue high-growth entrepreneurial ventures, influenced by societal norms that celebrate such achievements as masculine.

Conversely, female students showed a higher propensity toward social entrepreneurship, likely due to social conditioning and a greater

alignment with prosocial motivations. In addition, female students are more inclined toward lifestyle entrepreneurship, driven by passion and personal values rather than purely economic motives. Dickel and Eckardt (2021) focused on social entrepreneurial intentions, which involve the deliberate goal of establishing enterprises that tackle social problems using entrepreneurial approaches. These intentions have been recognized as significant predictors of social entrepreneurial behavior (Hockerts, 2017; Mair and Noboa, 2006). In particular, Dickel and Eckardt (2021) investigated how gender and sustainability orientation shape the effects of perceived desirability and perceived feasibility on social entrepreneurial intentions. The authors found that women showed a higher level of perceived desirability and social entrepreneurial intentions. Such results show that women translate a high level of desirability to a high intent to found a social business. Conversely, men showed higher levels of general entrepreneurial intentions. Similarly, Lopes *et al.* (2024) assessed the differences between male and female students in the formation of general entrepreneurial intentions and social entrepreneurial intentions. Female students show higher levels of social entrepreneurial intentions compared to males; conversely, males are more likely to form general entrepreneurial intentions.

Cardella *et al.* (2024) built on the models of social entrepreneurial intentions (Mair and Noboa, 2006; Hockerts, 2017) in which attitudes toward behavior were replaced by empathy, moral judgment was considered a substitute for social norms, self-efficacy and the perception of social support were considered proxies of behavioral control (respectively, internal and external behavioral control). Building on these models, the authors explored the role of emotional factors in predicting the social aspects of entrepreneurship and the effect of prior experience. The results showed that prior experience and empathy had a significant positive effect on social entrepreneurial intentions. Moreover, gender has a moderating effect on social entrepreneurial intentions, to the benefit of women. The results, in line with other studies, showed that social entrepreneurship is characterized by factors that are closer to the female value structure and, as such, social entrepreneurship could be seen as the women's entrepreneurship gap.

Few studies have built on gender theories to explain why differences exist between males and females. Muller *et al.* (2008) focused on self-efficacy and its relationship with gender role orientation. They found that there is no difference in the level of self-efficacy between males and females. However, when focusing on gender role orientation, individuals who align more closely with stereotypical masculine orientation tend to exhibit higher levels of ESE compared to those who demonstrate more stereotypically feminine traits, regardless of their biological sex. As the ESE construct is measured along different phases, the results showed that in the searching and planning tasks, a strong mix of masculine and feminine traits (androgyny) improves performance. In contrast, a strong masculine orientation has a higher impact on the creation process.

Perez-Quintana *et al.* (2017) also used GRO to disentangle the effects of sex, gender roles, and the decision to become an entrepreneur. First, they showed that entrepreneurial intention is higher for men than for women. Then, using a real gender perspective instead of a solely sex-based perspective, they showed that GRO is a more significant predictor of entrepreneurial decision-making compared to biological sex. Specifically, the analysis showed that both masculine and androgynous GRO are strongly associated with entrepreneurial intention across the entire sample, and they are better predictors than biological sex. Similarly, Sitaridis and Kitsios (2022) built on GST and TPB to assess the impact of gender-typed personality on students' entrepreneurial intentions and identify differences between genders. GST affirms that individuals are likely to behave in a way that conforms to gender roles, orientations, or identities set by their social environment. As such, they argued that masculinized traits are positively related to students' EI. Their results showed that stereotypically masculinized personality traits have a significant positive effect on students' EI, whereas stereotypically feminized traits do not.

Gupta *et al.* (2008) examined the impact of gender stereotype activation on men's and women's intentions to pursue entrepreneurship, a stereotypically masculine career. In particular, they not only looked at the impact of stereotypes but also proposed that making some stereotypes cognitively accessible (stereotype activation) in a specific situation affects attitudes and behaviors (Wheeler and Petty, 2001). The

activation of stereotypes can manifest implicitly or explicitly. Implicit activation occurs when stereotypical characteristics are associated with a task by describing it with those characteristics. In contrast, explicit activation links stereotyped characteristics directly to a stereotyped group. According to stereotype activation theory (SAT), implicit stereotypes may lead people to confirm the stereotype, while explicit stereotypes may prompt them to reject it. First, in line with other studies, the study showed that a gender gap exists between men and women in forming entrepreneurial intentions, meaning general stereotypes inhibit women from embarking on entrepreneurship. When entrepreneurship is implicitly linked with masculine characteristics, men present higher intentions than women; in contrast, when entrepreneurship is explicitly linked with masculine traits, women present higher intentions than men. Such results align with the SAT, which argues against the explicit activation of a stereotype. Interestingly, there are no differences between men and women when entrepreneurship is presented as a gender-neutral domain.

5.2.2 Faculty Entrepreneurship

As we focused on faculty, we observed that very few studies have investigated how academics form entrepreneurial intention, and the differences between genders. The general evidence, even in the context of academics, is that males are more likely to form entrepreneurial intentions than women. The studies have mainly tested the TPB, with a particular focus on gender (i.e., Alonso-Galicia *et al.* (2015) and Di Paola (2021); Fernández-Pérez *et al.* (2014)) to understand whether differences exist between males and females in the formation of entrepreneurial intentions and what these differences are. Only one of the papers analyzed built on feminist theory to support and better explain the differences between genders in the entrepreneurial process (i.e., Alonso-Galicia *et al.* (2015)). Finally, one study focused on the effects of context, in terms of entrepreneurship program effectiveness, on academic intentions (i.e., Epstein *et al.* (2022)).

Fernández-Pérez *et al.* (2014) focused on how social networks affect academics' entrepreneurial intentions. The study distinguished between

industrial and financial business networks and examined how these, along with personal social networks, influence academics' intentions to start business ventures based on their research. The research also looked into the psychological variables of entrepreneurial attitudes (EA) and self-efficacy on opportunity recognition (SOR) and considered the mediating role of gender. Using structural equation modeling, the study analyzed data from 500 Spanish academics in commercially oriented research fields. The results indicate that both industrial and financial business networks play positive roles in promoting entrepreneurial intentions, both directly and indirectly, through EA and SOR. There are notable gender differences, with male and female academics perceiving and utilizing support from industrial and financial networks differently when starting a business. Females are indeed less likely to form entrepreneurial intentions than males.

Alonso-Galicia *et al.* (2015) investigated gender differences in academics' perceptions of commercializing their research results. The paper explored how attitudes toward entrepreneurial activities, the influence of close social groups, and the opportunity recognition of self-efficacy affect these perceptions. The research used social constructionist feminist theory as a starting point to frame the cognitive factor analysis. The theory suggests that gender differences in perceptions and behaviors arise from socially constructed roles, leading men and women to develop distinct yet valid ways of thinking and rationalizing entrepreneurial activities. To test the hypothesis, a questionnaire was administered to 500 Spanish academics leading publicly funded technology-related research projects. The results were analyzed using multigroup structural equation analysis. Key findings included significant gender differences in the perceived influence of close social groups, particularly regarding support for academics' attitudes and perceived control over developing entrepreneurial intentions, with men more likely to form entrepreneurial intentions. The study contributes to understanding female entrepreneurship in academia by highlighting the crucial role of cognitive factors—attitudes toward entrepreneurship, subjective norms, and SOR—in explaining gender-based differences in entrepreneurial behavior. These cognitive factors are shown to be more influential than other variables, such as age, income, work status, and education level.

Goel *et al.* (2015) analyzed the entrepreneurship tendencies of academic researchers. They placed a particular focus on gender differences using survey data from a large public research organization, the Max Planck Institute in Germany. Although the average entrepreneurial propensities between male and female researchers are similar, significant gender differences exist in how various factors influence these propensities. The key findings revealed that prior patenting and institutional leadership are significant predictors of entrepreneurship for male researchers but not for female researchers. Unlike male scientists, possession of a doctoral degree and a preference for open access to research results do not significantly affect the entrepreneurial attitudes of female researchers. The study examined individual variables (e.g., personal attributes and education), situational determinants (e.g., professional experience), and contextual variables (e.g., perceived importance of technology transfer offices).

Miranda *et al.* (2017) investigated the impact of gender on the entrepreneurial intentions of academic staff at Spanish universities. The key findings indicated that both men and women in academia are influenced by similar factors in their entrepreneurial intentions, but the importance of these factors varies by gender. For women, entrepreneurial aptitude is the most critical factor, while for men, entrepreneurial personality takes precedence. Productivity, measured by the number of patents, significantly influences women's entrepreneurial intentions more than men's. Conversely, men are more influenced by the perceived utility of entrepreneurship. This study confirms that women in academia exhibit lower entrepreneurial intentions compared to men. This is not due to differences in the influencing factors but rather to implicit barriers faced by women. The lower entrepreneurial rates among women are attributed to nonobservable influences directly linked to gender, such as potential discrimination, cultural aspects, social differences, and family roles.

In a recent paper, Di Paola (2021) examined female academic entrepreneurship and the conditions under which entrepreneurial intentions could be fully explained. The paper integrated the literature on entrepreneurial intentions (i.e., TPB) and academic entrepreneurship with a focus on gender. The dataset used in this study comprised a

sample of 52 researchers belonging to university institutions in Italy and was analyzed through a fuzzy-set qualitative comparative analysis (fsQCA). The study found that exposure to entrepreneurial role models is crucial for building self-efficacy; furthermore, the timing and context of this exposure are important. The study confirmed the relevance of attitudes, subjective norms, and self-efficacy in shaping entrepreneurial intentions. It challenged the existing literature by showing that attitudes only consolidate entrepreneurial intentions beyond gender when combined with high perceived self-efficacy, which helps individuals feel capable of entrepreneurial tasks despite negative social perceptions. Social perception significantly influences the entrepreneurial intentions of female researchers.

Finally, Epstein *et al.* (2022) focused on the US National Science Foundation's Innovation Corps (NSF I-Corps) program, aiming to explore gender differences in prior experience and attitudes toward entrepreneurship training to suggest program improvements. The key findings indicated that female participants reported less entrepreneurial experience before the program, poorer team relationships during the program, and lower entrepreneurial intention and technology commercialization readiness at both the beginning and the end of the program compared to male participants. Despite these differences, no gender differences were found in the perceptions of the instructional climate or program usefulness. The purpose of this study was to explore gender differences in participants' experiences of a large-scale academic EE program and to assess its effectiveness. The results suggested potential changes to I-Corps and similar programs, such as providing more explicit instructions for tasks with which female participants have less experience (e.g., applying for patents), offering guidance for team interactions, and providing mentorship to address low self-efficacy, which may lead women to underestimate their project's potential success.

5.2.3 Context

As we considered the external environment, two main groups of studies were identified. The first group relied on the TPB to assess how the social and structural environment affects the propensity of individuals to

enter entrepreneurial activities. The samples examined in these studies covered different countries, with the aim of assessing the role of cultural aspects for females and males in the entrepreneurial process. The second stream of literature aimed to disentangle at the university level how women can benefit from entrepreneurial education and to what extent entrepreneurial education might impact the reduction of the well-known gender gap.

Among the first group of studies that rely on the TPB in the social and cultural context, Santos *et al.* (2016) built upon the SCT (Bandura, 2001) and argued that the social environment surrounding individuals affects their cognition and behavior and, as such, their decision to become entrepreneurs. In particular, the social environment is exerted at both the macro and micro levels (Morris and Schindehutte, 2005). The microsocial environment comprises friends, family, and acquaintances; the macro level comprises social values and culture shared by society. Both affect individual perceptions of entrepreneurial activity. The results confirmed that men exhibited higher intentions than females. As for the environment around them, both males and females have similar perceptions about the macrosocial and microsocial environments and support for entrepreneurship. Although the macrosocial environment positively affects male perception in terms of personal attitude and behavior control, it does not affect females. As for the micro social environment, both male and female perceptions were similarly affected by the valuation of entrepreneurship in their closer environment.

Similarly, Gomes *et al.* (2022) also aimed to assess the role of the environment, such as closer valuation (i.e., the inner circle of individuals) and social evaluation, and the impact on the antecedents and formation of women's entrepreneurial intention. The study focused on a sample of female students and provided a test of the TPB, showing a significant positive effect of attitude on behavior, perceived behavior control on intention, and the partial effect of social norms on intentions. As for environmental characteristics, the study showed that closer valuation has a significant positive effect on attitude and subjective norms, while social evaluation, which refers to the broad social perception concerning entrepreneurship, has a positive impact on subjective norms and perceived behavioral control.

Roy and Das (2020) investigated the role of culture and gender in the development of entrepreneurial intentions. In particular, the paper focused on India due to the country's unique cultural and institutional context, and explored how culture influences gender profiling and differences in entrepreneurial factors to predict entrepreneurial intention (EI). The study used Hofstede's framework (Hofstede, 1980) for cultural dimensions and Shapero's entrepreneurial event model (Shapero and Sokol, 1982) to show how cultural factors and individual perceptions influence the formation of entrepreneurial intentions. The study revealed that male students generally align with societal attitudes toward entrepreneurship, while female students face greater scrutiny and obstacles, showing lower levels of entrepreneurial intention. It also suggests that education and social settings significantly impact personality traits, perceived support, and entrepreneurial knowledge, which in turn affect entrepreneurial intention. Finally, the presence of an entrepreneurial university positively influences students' perceptions of entrepreneurial support and knowledge, while gender plays a moderating role in the relationship between entrepreneurial knowledge and intention, with males more likely to develop entrepreneurial intentions.

Shneor *et al.* (2013) also adopted Hofstede's framework to assess the cultural dimension, particularly the cultural construction of gender, which affects the formation of entrepreneurial intention. The authors conducted a comparative study between Norway and Turkey, as they represent two national cultural contexts that have different influences on the decision to engage in entrepreneurship (Hofstede and McCrae, 2004). Norway represents a country with a high level of individualism, low power distance, low masculinity, and low uncertainty avoidance, while Turkey represents a relatively masculine, high-power distance, uncertainty avoiding and collectivistic society. The results of the study show that Turkish people present a higher level of entrepreneurial intention and that, regardless of national background, males have higher levels of entrepreneurial intention, self-efficacy, and perceived social norms. Interestingly, the study shows that the differences between male and female entrepreneurial intentions are contingent on the national context. Different cultural norms about gender roles can affect how individuals see entrepreneurship as a career choice. This can discourage

some individuals from pursuing entrepreneurship if it does not match their society's idea of what men or women should do.

In addition, the other three studies in our review extended the TPB, focusing on additional antecedents that reflect the structural and social environment in which individuals are embedded. Meeralam and Adeinat (2022) focused on Saudi Arabia to address the role of university support and how it is perceived as providing the required knowledge, skills, and inspiration for starting a new business venture. They also examined the fear of failure, which is highly culture-related; it is perceived among Saudi Arabia's aspiring entrepreneurs as one of the main obstacles to embarking on entrepreneurship (Bosma *et al.*, 2021). The results show that university support has a significant effect on perceived behavioral control, which, in turn, had a positive impact on the entrepreneurial intentions of female students. With regard to the fear of failure, they found a significant positive effect on attitudes toward entrepreneurial intentions. Kumar and Das (2019) focused on India and addressed the role of institutional infrastructure and two social factors: peer effect and gender discrimination. The study revealed a positive correlation between peer influence and individual attitudes toward entrepreneurship.

Additionally, it identified a positive moderating impact of institutional infrastructure on entrepreneurial intention within a regional entrepreneurial ecosystem. However, when they examined the impact of institutional infrastructure on ESE, their findings were inconclusive. Furthermore, the research indicated that gender discrimination remains a significant factor in the decision to pursue an entrepreneurial career in India. Finally, Karimi *et al.* (2014) explored the effects of the presence of entrepreneurial role models on entrepreneurial intention through their antecedents and examined whether the effects vary by gender. Role models have been defined as one of the most important sociocultural factors that play a role in entrepreneurship. According to Gibson (2004), role models can generally serve three interrelated functions: "to provide learning, to provide motivation and inspiration and to help individuals define their self-concept". The results showed that perceived behavioral control and attitudes toward entrepreneurship were more strongly influenced by role models for female students than for male students.

The second group of studies in the “context” cluster dealt with the role of entrepreneurial education. Whether there seemed to be consensus on the positive role of education in the generation of EI, the results were in contrast when the gender issue was addressed. Some studies have found that entrepreneurial education has a more positive impact on women and boosts their interest and perceived ability to be entrepreneurs (Nowiński *et al.*, 2019; Pergelova *et al.*, 2023; Wilson *et al.*, 2007). Other studies, such as Joensuu *et al.* (2013) and Shinnar *et al.* (2014), and Westhead and Solesvik (2016), reported that EE is more conducive to entrepreneurial intentions for males, as in most cases, EE is biased toward masculinity and as such may negatively affect entrepreneurial outcomes for female students. Wilson *et al.* (2007) explored the relationships between ESE and entrepreneurial intention across genders in greater detail. They examined these relationships at two life stages for individuals who were, or potentially were, interested in entrepreneurship as a career: teens in middle and high school and adults aged 25–34, who had already chosen a career in management and were actively pursuing their master of business administration (MBA) degrees. They aimed to assess the relationship between entrepreneurial training and entrepreneurial self-efficacy among MBA students.

The study showed that females presented a lower level of self-efficacy than males in middle/high school and MBA programs. Such results are particularly interesting, as they show that self-efficacy among girls and women has a similar pattern. Moreover, the results supporting most of the literature on entrepreneurial intentions showed that entrepreneurial intentions were higher for teen boys than for teen girls, but could not show a causal relationship between self-efficacy and intentions. Finally, the study revealed that targeted education, specifically an entrepreneurial concentration within an MBA program, had a more pronounced impact on enhancing self-efficacy among women than men. This finding underscores the critical role of well-designed educational initiatives in broadening the perceived entrepreneurial career pathways available to women. By providing tailored educational opportunities, institutions can empower women to pursue entrepreneurship with greater confidence.

Shinnar *et al.* (2014) set out to investigate the impact of EE on ESE and intention, specifically focusing on how gender moderates this relationship and relying on SCT. The authors suggested that EE has the potential to bolster self-efficacy, thereby empowering individuals to form entrepreneurial intentions. Focusing on gender, their results showed a statistically significant increase in self-efficacy after taking a semester course in entrepreneurship for males but not for females. Moreover, the relationship between ESE and entrepreneurial intention was contingent on gender. After an introductory entrepreneurship course, it was observed that entrepreneurial intentions were more robust for female students than for male students. Such results show that men's entrepreneurial intentions were less dependent on ESE than women's.

Westhead and Solesvik (2016) explored the role of EE participation, alertness, and risk-taking skills and the intensity of entrepreneurial intention with regard to becoming an entrepreneur. To assess how gender moderates such a relationship, the authors built on theories of human capital and socially learned stereotypes. In particular, the authors followed the insights provided by Jones (2014) and hypothesized that EE is gendered-biased toward masculinity and may negatively affect female students' entrepreneurial outcomes. Indeed, the results showed that EE has a positive effect on entrepreneurial intention. However, EE did not benefit all participants; women reported significantly lower intention intensity than their male counterparts. However, female students who gained alertness skills in the entrepreneurship course reported a higher intensity of intention than did female students who did not follow an entrepreneurship course.

van Ewijk and Belghiti-Mahut (2019) also examined the effect of entrepreneurial education on entrepreneurial intentions in the context of the United Arab Emirates. In particular, to assess entrepreneurial intentions, this study aimed to integrate Krueger's entrepreneurial intentions model, gender stereotypes, and the role of EE. The results aligned with other studies showing that female students have lower entrepreneurial intentions than men. In particular, the authors argued that gender stereotypes inhibit females' propensity in forming entrepreneurial intentions, as women consider entrepreneurship less desirable and less feasible.

Nowiński *et al.* (2019) investigated whether EE contributes to the entrepreneurial intentions of university students in the Visegrád countries (Czech Republic, Hungary, Poland, and Slovakia). The study showed that entrepreneurial education positively impacts intention through entrepreneurial self-efficacy. Females are less likely to create entrepreneurial intentions, but entrepreneurial education can affect female entrepreneurial self-efficacy and diminish the disparity between men and women.

Salavou *et al.* (2021) assessed the direct effect of EE on intentions by comparing two groups of young adults with and without academic EE. The study showed that men are more likely than women to form entrepreneurial intentions. Conversely, the evidence showed that women are less interested in starting a business, even when undertaking an entrepreneurship course during their university studies. Interestingly, EE inside and outside universities does not make any difference in the entrepreneurial intentions of young men. Ramadani *et al.* (2022) explored the moderating effect of gender on the relationship between entrepreneurial education and intention. The study showed a positive and significant impact of entrepreneurship on entrepreneurial intentions. Then, when exploring the moderating effect of gender, the results showed no difference between men and women. Students, regardless of their gender, who take entrepreneurial courses and engage in entrepreneurial events, seminars, expos, and business practices show similar entrepreneurial intentions.

Pergelova *et al.* (2023) showed the effect of EE on the desirability and feasibility of an entrepreneurial career and subsequent intentions to start a technology business among female and male STEM students. In doing so, the measure of EE is more nuanced in assessing participation in an entrepreneurship course, exposure to role models, and perceived entrepreneurship support from the university. The results showed a significant positive effect of participation in an entrepreneurship course on feasibility, desirability, and intentions for technology entrepreneurship among female STEM students compared to their male counterparts. However, the significant positive effect was only EE measured by participation in a course, not in other cases. Such results, holding for the

sample in the analysis, highlighted that women are more affected by learning about and practicing entrepreneurship skills than other factors.

Finally, some studies in our review drew attention to the effects of different academic fields on the formation of entrepreneurial intention. López-Delgado *et al.* (2019) showed the validity of the TPB and demonstrated the presence of positive relationships among EE programs, gender, and entrepreneurial intention. In particular, the results showed that men in the business academic field have higher entrepreneurial intentions.

Similarly, in a more recent paper, Polin (2022) found that business students show higher entrepreneurial intentions than those in engineering and nursing and that such intentions do not vary over time. The author argued that it is not the degree per se that affects intention, but rather the choice of field (self-selection). More importantly, this study did not find significant differences between genders when controlling for discipline, indicating the presence of gendered fields into which students self-select *ex ante*.

5.2.4 Summary

Section 5.2 examines gender differences in the entrepreneurial intention among university students and faculty. Men generally exhibit higher entrepreneurial intentions, driven by greater self-efficacy, risk-taking, and alignment with societal norms that associate entrepreneurship with masculine traits. Women, while often motivated by autonomy, flexibility, and social impact, face barriers such as lower confidence, fear of failure, and societal expectations.

The most relevant theories used to explain these differences are the Theory of Planned Behavior (TPB) and Gender Role Orientation (GRO), showing that masculine or androgynous traits often correlate with stronger entrepreneurial intentions. Entrepreneurial education (EE) can positively impact intentions but often benefits men more due to gender biases in content and delivery. Tailored education programs, particularly those enhancing women's self-efficacy, can significantly reduce these gaps.

Faculty members mirror these trends, with men more likely to engage in entrepreneurial activities due to factors like patenting and leadership roles, while women rely more on social networks and institutional support. Contextual factors, including cultural norms and university environments, play a crucial role. Masculine-oriented cultures and traditional gender stereotypes exacerbate disparities, whereas exposure to role models, supportive ecosystems, and social entrepreneurship opportunities can empower women.

Overall, Section 5.2 emphasizes the need for inclusive education, institutional support, and cultural shifts to address gender disparities in entrepreneurship and foster equitable participation.

5.3 Action

5.3.1 Student Entrepreneurship

Very few articles addressing the action phase of the entrepreneurial process for university students were found, all of which referred to the foundation of new ventures. The articles in this section focus on actual entrepreneurial behavior, i.e., when individuals take entrepreneurial action. The rich literature on nascent entrepreneurship was not considered in this specific section, as it relates more to an entrepreneurial intention not fully undertaken.

The general evidence was that male students are more likely to be involved in entrepreneurial activities than females. The only exception was illustrated by Ng *et al.* (2016), who interviewed a sample of 31 college students who had become *wei-shangs*, a Chinese expression indicating a businessperson who conducts their business using a mobile app platform. They demonstrated that female *wei-shangs* have a competitive advantage compared to their male counterparts.

The studies in this section considered different types of students. Shinnar *et al.* (2018) focused on management students during their first session in an introductory entrepreneurship course, whereas Figueroa-Domecq *et al.* (2022) focused on undergraduate tourism students who became entrepreneurs. Piva and Rovelli (2022) analyzed graduates' entrepreneurship, while Muscio and Vallanti (2022) focused on PhD

Table 5.5: Articles on student entrepreneurship (action) classified by theoretical perspective

Individual Characteristics	Stereotypes	Mixed: Individual Characteristics & Stereotypes
Figueroa-Domecq <i>et al.</i> (2022) and Ng <i>et al.</i> (2016)	Markussen and Røed (2017) and Shinnar <i>et al.</i> (2018)	Epstein <i>et al.</i> (2022) and Muscio and Vallanti (2022); Piva and Rovelli (2022)

students. Epstein *et al.* (2022) focused on the US NSF I-Corps program, a nationwide entrepreneurship training program available to faculty and graduate students in the engineering and technology disciplines. Finally, Markussen and Røed (2017) based their analysis on early-career labor market entrants as regular employees or entrepreneurs in Norway, in particular those who had just completed their studies.

The theories adopted to explain the difference in entrepreneurial activities between male and female students in the “action” cluster can be attributed to two groups of reasons. The first group includes a series of individual characteristics more frequently associated with the female gender, such as risk aversion (as in Gimenez-Jimenez *et al.*, 2020) and self-confidence, education, and personal relationships (Verheul *et al.*, 2006; Zhang *et al.*, 2009). The second group of reasons includes aspects such as the cultural and institutional context (Gupta *et al.*, 2022) and the negative perceptions and evaluations from which women suffer due to gender stereotypes (e.g., Marlow and Patton, 2005). In Table 5.5, studies on student entrepreneurship action are summarized according to these theories.

Ng *et al.* (2016) focused on the first group of reasons by interviewing 20 female and 11 male student entrepreneurs in China. In particular, they referred to the fact that scholars characterize entrepreneurship as a masculine domain, and male entrepreneurs outperform female entrepreneurs because female entrepreneurs lack the masculine characteristics required for success (Verheul *et al.*, 2006). Contrary to the extant literature, however, they found that female student entrepreneurs

gained an edge over their male counterparts in female-focused product markets. In the case of *wei-shangs*, feminine characteristics, such as supportiveness, are key to their success, as they gain customer loyalty and expand their business network by expanding their friendship network.

In a similar vein, Figueroa-Domecq *et al.* (2022) illustrated the difference in individual entrepreneurial characteristics between male and female undergraduate tourism students in Spain. The authors received 539 complete questionnaires from 14 universities located throughout Spain's autonomous regions (Madrid, Andalusia, Catalonia, Canary Islands, Galicia, and Cantabria). The final sample comprised 70% women and 30% men. What emerged was that women students are more risk-averse, but neither behavioral control nor personal attitudes seem to be gendered at this stage of the journey. Men and women engage in sustainability differently and in different areas. Sustainability is an important motivator for female entrepreneurs and is strongly linked to the potential of their entrepreneurship to generate environmental products and inclusive workplace environments, while men are more likely to see sustainability in terms of business opportunities. There are gender differences in approaches to risk, although these are complex, with women commenting on both their concerns and social constructions of gender differences. However, there are considerable variations in the extent to which men express their competence, or perhaps overconfidence, to manage risks and uncertainty. Gender differences are, instead, absent in respect to personal attitudes.

In contrast, Shinnar *et al.* (2018) examined how potential entrepreneurs believe that society reacts to them based on their gender identity rather than on the direct impact of gender itself. Students enrolled in an introductory entrepreneurship course—a required course for all management majors—at a university in the United States were surveyed over the course of three academic years between 2009 and 2012. Of the 179 complete cases (response rate around 24%), 41 respondents, or 22.9% (10 women and 31 men), had actually started a venture, and 10 of those 41 had already exited the venture they started. The authors turned to SRT (Eagly *et al.*, 1992) and the gendered entrepreneurship perspective (Gupta *et al.*, 2008, 2009), which suggest that entrepreneurship is a

gendered process in that women and men face different social expectations and different levels of support in their environment with regard to entrepreneurship (in the female entrepreneurship literature, see, e.g., Langowitz and Minniti, 2007; Wilson *et al.*, 2004, 2007, 2009; Zhao *et al.*, 2005). Because the normative representation of entrepreneurship is dominated by masculinity (Henry *et al.*, 2016; Zampetakis *et al.*, 2016), lower social expectations to engage in entrepreneurship and weaker anticipated environmental support for entrepreneurial endeavors might dampen women's entrepreneurial intention. Lower social expectations and environmental support could also make women who intend to start businesses less likely to actually do so. Based on our results, it appears that socially prescribed gender roles suppress women's intentions to enter entrepreneurship and weaken their propensity to act on their intentions. This two-step suppression of women's entrepreneurial behaviors could account for a large proportion of the lower rates of entrepreneurial activity among women in the United States.

Markussen and Røed (2017) traced the career trajectories of 253,000 school graduates over the period of 2001–2012 from the administrative registers in Norway. During the first five years, 10.5% of the men and 5.7% of the women engaged in some form of entrepreneurship. Hence, the gender gap at this stage of the labor market career is 4.8 percentage points. Over the entire period of observation, it was evident that entrepreneurship rates, as well as the gender gap, increased monotonically with the years following graduation. Since existing entrepreneurship rates are much higher for men than for women, this mechanism represents an important source of persistence in the gender gap. Females are underrepresented in entrepreneurship today, partly because they were underrepresented in the past. Moreover, the authors found that early career entrepreneurship is strongly affected by existing entrepreneurship activities among family members, neighbors, and schoolmates.

Finally, there are studies that entail both groups of reasons. For example, Piva and Rovelli (2022) analyzed a sample of 13,761 graduates from an Italian technical university. They found that 4.2% of male students founded a company or were listed among the shareholders in the national registry of Italian companies in the years following graduation. The value for female students was much lower, equal to

1.9%. One explanation referred to the underrepresentation of women in STEM degree programs, as only 34.2% of the graduates in the population are women. The share of women among graduate entrepreneurs was even lower (19.0%; 89 women vs. 379 men). The significant difference between these two shares suggests the presence of a differing likelihood of entrepreneurial entry. The authors focused on three antecedents of women's lower propensity to choose an entrepreneurial career that are debated in the literature on female entrepreneurship: women's lack of self-confidence, their lower human capital and smaller networks, and gender discrimination in resource allocation.

These results were confirmed by Muscio and Vallanti (2022), who administered a questionnaire survey to 23,500 PhD students enrolled in several programs in Italy between 2008 and 2014, representing 50% of all PhD students in Italy at the time. Among the 9,062 respondents, 6.5% started a business, 87% of which were still active at the time of the survey. According to this study, female students are especially sensitive to difficulties in finding appropriate competencies in terms of scientific and managerial know-how, as well as in finding appropriate equipment and capital goods. Their risk aversion also seems to be lower than that of males.

Epstein *et al.* (2022) addressed a unique initiative: the I-CORPS. The US National Science Foundation's Innovation Corps is an entrepreneurial training program that facilitates the transformation of invention to impact. It uses small teams that connect graduate students, faculty members, and practitioners. The study was based on a survey administered between 2012 and 2016 involving 2,589 participants, including 912 students. Among the graduate students involved in the initiative, women were less likely than men to have presented a business idea to investors within the considered timeframe. Women were less likely than men to apply for or receive a patent or participate in industry-funded research. Moreover, women reported significantly poorer perceptions of team relationships than did men, making social interactions a potential problem for female participants. Moreover, the authors detected gender differences in entrepreneurial intention and commercialization readiness that are consistent with existing literature showing that women report

lower entrepreneurial self-efficacy (Dempsey and Jennings, 2014), entrepreneurial intention (Kickul and D'Intino, 2005), and, ultimately, entrepreneurial behavior (Marlow and McAdam, 2012).

5.3.2 Faculty Entrepreneurship

Table 5.6 shows the articles selected based on the theory adopted to illustrate the results of the studies. The reviewed articles focused on both formal and informal entrepreneurial activities, with the latter including noncommercial activities. There was a predominance of studies about formal activities, and even the few that investigated informal mechanisms did so in comparative terms.

Concerning formal mechanisms, Colyvas *et al.* (2012) was the only study focusing on disclosures. The authors compared a sample of 161 female (14%) and 927 male US medical school faculty members and found no significant differences between men and women in their likelihood of commercializing inventions. The main difference was in the disclosure volume, as men commercialized a greater number of inventions than women. These findings appeared to contrast in part with a previous study by Thursby and Thursby (2005), which analyzed a sample of over 4500 academics from 11 major US universities and found that women (who represent just over 8% of the population) are less likely to disclose inventions than men. To explain their results, Colyvas *et al.* (2012) suggested that the difference between women and men could be attributed to occupational and resource factors, such as professional experience, the security of tenure, and the stock of scientific and pecuniary resources they have (see Whittington, 2011). Thus, once they controlled for these factors, women in the sample turned out to be just as likely to participate in commercializing their research findings as their male counterparts. This is in line with the demand-side perspective on the gender gap.

One formal mechanism that has been studied extensively is patenting. Here, the theory adopted to explain gender disparities is mainly grounded in the supply-side perspective, relying on human and social capital. Human capital, measured in terms of tenure and age, was adopted by Allen *et al.* (2007), who investigated the propensity of

Table 5.6: Articles on faculty entrepreneurship (action) classified by theoretical perspective

Mechanisms	Demand-Side	Supply-Side	Demand-Side & Supply-Side
<i>Formal activities</i>			
Disclosures/Licensing	Colyvas <i>et al.</i> (2012)		
Patents		Allen <i>et al.</i> (2007), Meng (2016), Whittington (2011, 2018)	Ding <i>et al.</i> (2006) and Murray and Graham (2007)
Spinoff establishment	Rosa and Dawson (2006)		Abreu and Grinevich (2017)
Spinoff performance	Lauto <i>et al.</i> (2022)		Woolley (2019)
<i>Informal activities</i>			
Scientific advisory board	Ding <i>et al.</i> (2013)	Ding and Choi (2011)	
Consulting	Hallilem <i>et al.</i> (2022)	Haeussler and Colyvas (2011)	
Industry collaborations			Tartari and Salter (2015)
<i>Non-commercial activities</i>			
Informal advice & public lectures			Abreu and Grinevich (2014)

1,335 US university faculty members to work directly with industry on research activities that lead to patents. Tenured, older, and more experienced male faculty members were likelier to develop patents in collaboration with industry. Human capital, especially previous involvement in patenting, was at the center of a study by Whittington (2011). She focused on gender and motherhood disparities in patent activity across academic and industrial domains. She illustrated that motherhood in general is critical for both academic and nonacademic women. Gender differences rooted specifically in the subpopulation of women with children suggest that fewer mothers are interested in becoming inventors, or that fewer have the time or necessary support to become involved.

Differences between mothers and others are related to additional factors beyond resource allocation or time demands. Mothers receive less interest from potential buyers, such as outside investors or firms, because, due to their condition, mothers are considered deficient in competency, commitment, and availability (Whittington, 2011). Furthermore, mothers' status and/or assumed (lack of) availability means that fewer are approached by colleagues or mentors with information on the commercial process or with invitations to collaborate in such endeavors. Because women report less interaction with and invitation to the commercial process, the tangible challenges parenthood presents may interact with commercial demand-side processes to reinforce differing outputs. Yet the supply side prevails, as once the differences in previous involvement are accounted for, female scientists (mothers or not) are just as likely to patent as male scientists in academia. One important difference between mothers and others, then, is that they do not appear to have as much previous involvement.

On the other hand, social capital was the core argument in the articles by Meng (2016) and Whittington (2018). The former focused on 1283 US scientists, among whom 252 had patent applications, and analyzed the role of boundary-spanning collaboration ties, which encompass collaboration ties with industry, government, other disciplines, and other universities. The authors found that for women, having collaboration ties

with industry would significantly promote their engagement in patenting, and that the differential effects of collaboration ties with industry usually help explain the gender distinction in patenting engagement.

Whittington (2018) focused on the women's position in the network by specifically addressing the extent to which women are isolated or on the periphery in collaborations. Interestingly, women are not situated more peripherally in terms of their close ties, nor are they located among less dense subsets of ties (clustering) or those for whom their ties are less important (aggregate constraint). As expected, however, a focus on collaborative networks revealed substantial differences between men and women with respect to their strategic positioning among other inventors. Most notably, women are much less likely to collaborate in positions traditionally thought to lead to added innovative benefits—positions that hold brokerage opportunities. In addition, men tend to include more men in their collaborations, and women more women.

Arguments in favor of both the supply side and the demand side can be found in studies by Ding *et al.* (2006) and Murray and Graham (2007). Ding *et al.* (2006) suggested that although patenting has become common in the academic life sciences, particularly for highly productive and networked faculty, and among the most senior faculty, a large gender gap persists, reinforced by women's limited commercial networks and traditional views of academic careers. Their study showed that, holding productivity, social network, scientific field, and university characteristics constant, comparable female life scientists patent at only 0.40 times the rate of equivalent male scientists. A potential explanation for this varying behavior might be different research productivity, as productive researchers are more likely to patent. The authors excluded the fact that men and women do qualitatively different kinds of research—the average number of citations and the journal impact factor of papers slightly favors women's research. Therefore, the authors suggested a twofold explanation.

The first was a lack of exposure to the commercial sector. Most (but not all) women had few contacts in industry. Lacking these connections, women found it time-consuming to gauge whether an idea was commercially relevant. Whereas men sought advice from their often broad-reaching networks, women frequently depended on close

relationships with male collaborators to initiate the patenting process. Most senior female faculty perceive themselves as being excluded from industry relationships and therefore fail to develop an understanding of how commercial science works. The second hurdle was the concern that pursuing commercial opportunities might hinder their university careers. The women interviewed were likely to describe the challenges associated with balancing multiple career elements: teaching, research, and commercialization. Murray and Graham (2007) looked at three levels of commercialization behavior—engagement in patenting activity, patent quantity, and quality. It is important to examine the factors that contribute to scientists' decisions or opportunities to patent in the first place, in addition to the amount that they patent. Gender differences occur at the point of access to commercial activity as well as its production. Although female scientists participate and produce less, the quality and impact of their patents are equal to or better than those of male scientists. This finding in academia is consistent with the general evidence on patenting activities Caviggioli *et al.*, (2023).

Trends in female involvement in commercial activity might be described similarly to the traditional gender “pipeline” analogy. As the degree of commercial involvement increases (from simple participation to accruing a substantial number of patents), the number of women involved, proportional to men, decreases in a filtering process. According to Murray and Graham (2007), industrial scientists are more likely to have patented than academic scientists regardless of their gender. When analyzing gender differences, women in industry are involved in commercial activity to the same extent as their male counterparts, while women in academia are less involved than men (for similar results, see Whittington and Smith-Doerr (2005)). Although the gender disparity in patenting involvement is lower for industrial scientists than for those in academia, there are no significant differences in the rates at which male and female inventors patent across the two sectors. Hence, differences between the academic and industrial sectors appear to stem largely from unequal opportunities to engage in such behavior rather than the amount of productivity once involved. Therefore, because academics are typically free to choose their research topics, gender differences within the university may suggest that fewer women (1) are interested

in becoming involved with commercial work, (2) have a research focus that lends itself to commercial applications, or (3) have exposure to knowledge about how the commercial process works.

The last formal mechanism under consideration is spinoff activity, which can be decomposed in establishment and performance. Focusing on the establishment of academic spinoffs by faculty, two UK-based studies have been identified: Rosa and Dawson (2006) and Abreu and Grinevich (2017). Rosa and Dawson (2006) studied the founders of UK university spinout companies from 20 leading universities. The proportion of female founders in their sample was low: around 12%. The in-depth interviews conducted with 21 female founders and a male control sample showed that few women had the chance to lead a spinout, owing to the low number of women in senior research positions in many leading science departments. Among them, whereas the percentage of spinoffs with a single founder is almost the same for males and females, most of the women surveyed tended to be part of entrepreneurial teams involving senior male colleagues. More interestingly, there were no female academic founders for any of the companies that included nonacademic founders. External interest thus tended to target senior academics, who are proportionally mostly male.

The women interviewed were “frequently” involved in securing large externally funded research projects from public, charitable, or industrial funding sources; they undertook specific research projects for organizations at least occasionally and all provided consultancy services. This might have allowed them to develop social networks with fewer key stakeholders, such as companies and funding providers, than many female entrepreneurs. One possible explanation is the difference in administrative career paths between male and female academics. The female founders were firmly committed to their own research and teaching, and most of their administrative commitments were directly focused on managing their research teams, teaching, and applying for grants. Men were focused on the same things but seemed more ambitious in their administrative interests, especially in relation to wider departmental and university administration; they even contributed to organizations outside the university. Expanded administrative commitments may be more useful in expanding social and business networks, which are

particularly important for the development of knowledge-based and high-technology businesses.

Abreu and Grinevich (2017) provided a more comprehensive picture by showing the relevant gender gap among UK academics. The differences between men and women involved in entrepreneurial activities were, respectively, 6.1% for patenting activity, 6.8% for consultancy work, 3.9% for licensing, and 3.2% for spinouts. They were able to disentangle the supply-side and demand-side explanations in empirical terms. Of the total, 39% of the gender difference indicated gender-based discrimination and was therefore related to the supply-side explanation. In contrast, 61% of this gap could be explained by differences in endowments according to the demand-side explanations of the gender gap. The main components of the endowment in their analysis were professorship (14%), academic discipline, particularly engineering and the physical sciences (14%), and previous experience in starting or running a small business (23%). Of particular interest was the large effect associated with previous experience. Limited exposure to commercial activities creates greater barriers to engagement and can explain the significant constraints on female academic entrepreneurship. This is in line with other studies on patents (Allen *et al.*, 2007; Whittington, 2011). The remaining 39% indicated gender-based discrimination and therefore supply-side explanations.

When the performance of academic spinoffs is analyzed, the situation becomes more nuanced. Lauto *et al.* (2022) analyzed the amount of private investment from venture capitalists received by 526 Italian academic spinoffs from 37 universities. The study showed that the amount of finance raised by an academic spinoff from private investors is negatively associated with the share of capital in female entrepreneurial team members' hands. From one perspective, this may be surprising, as in the context of academic entrepreneurship, gender differences should be flattened by the fact that the scientific human capital of academic entrepreneurs—both male and female—is proven by a lengthy and systematic series of assessments, and that both female and male academics typically lack business and commercialization experience (Shane, 2004). Therefore, investors should see academics as a homogeneous group of outsiders to the business world, with little or no difference between

genders. Instead, introducing a female academic into a team adds uncertainty and increases information asymmetry, thus sending a negative signal to investors. This finding confirms the idea of the existence of a deeply rooted propensity among businesspeople to value men as more successful managers, more competent, self-confident, ambitious, and worthy of authority and leadership.

Even more, in practice, academia's institutional context has been—and still is—regulated by masculinity, which assumes the male model as the ideal scholar: male academics are more numerous, reach higher rankings (e.g., full professorship, department directorship), and have better access to research funding and visibility (Meng, 2016; Whittington, 2018). Male dominance also characterizes the related domain of science commercialization (Hmieleski and Powell, 2018), as female scientists are less involved in formal and informal technology transfer activities (Tartari and Salter, 2015) and academic entrepreneurship (Woolley, 2019).

Woolley (2019) investigated the likelihood of obtaining venture capital funding and other performance measures, such as the probability of failing or of a merger and acquisition. The author recognized that, on the one hand, given the depth and breadth of the challenges that women entrepreneurs in technology face, one could expect women's firms to perform poorly. Women founding firms, especially in STEM-related fields, face both career- and field-specific obstacles. According to the gender role congruity theory, female technology entrepreneurs must overcome stereotypes, discrimination, and exclusion from networks (Haeussler and Colyvas, 2011; Rosa and Dawson, 2006; Stephan and El-Ganainy, 2007), which typically lead to difficulty building legitimacy and firm growth (Eddleston *et al.*, 2016). On the other hand, women starting firms in technology fields may have qualities and characteristics that make them better prepared to succeed. In addition, the incongruity of gender and role may be beneficial.

For example, women with technology careers have chosen to work in a fairly unsupportive environment, which may suggest that they are aware of the challenges and may even be well-suited to thrive in this setting. Similarly, when a woman founding a technology firm overcomes

the inherent obstacles, it indicates the tenacity and perseverance necessary for successful entrepreneurs; some may even find these challenges motivating. Indeed, women who stay in engineering careers are reported to have higher self-efficacy, identify with the profession, and are motivated by the challenges of engineering. As such, one would expect their firms to perform better. Woolley (2019) showed that firms with founders who were female professors were more likely to suffer a negative closure, were less likely to be acquired, and were less likely to obtain funding. Nonetheless, when the heterogeneity of founders' backgrounds is considered together with gender, a more nuanced understanding emerges. Contrasting career-specific norms within academia may explain the firm outcome trends for ventures started by professors versus research scientists.

Among the studies dealing with informal mechanisms for entrepreneurial activities, we identified three specific types: participation on scientific advisory boards of companies, consulting activities, and collaboration with industry. The likelihood that male or female academic scientists will join corporate scientific advisory boards is different (Ding and Choi, 2011; Ding *et al.*, 2013; Murray and Graham, 2007). Ding *et al.* (2013) investigated mechanisms that may account for the gender gap in university scientists' participation in private-sector scientific advisory boards. The mechanisms they examined are informed by demand-side theories emphasizing biases that create unequal opportunity structures for men and women, and supply-side theories that attribute different outcomes to heterogeneities in human capital or career preferences between the genders. Their analyses showed that female scientists are much less likely than men to join the advisory boards of for-profit biotechnology companies. With controls for scientists' professional accomplishments, social networks, employer characteristics, and proxies for their interest in commercial science, they found that male scientists were almost twice as likely to join scientific advisory boards. This gender gap is roughly comparable to the rate of patenting among scientists found in previous studies (Ding *et al.*, 2006; Whittington and Smith-Doerr, 2005). The preponderance of their evidence supports demand-side theories. First, the finding that past leadership positions have a much stronger effect

for women than for men possibly indicates the perceived incongruities between being female and leadership roles in commercial science.

Likewise, the result that having many coauthors in publications has a stronger effect on the transition rate for women faculty suggests that well-structured networks with strong ties help women overcome traditional out-group biases. Second, accounting for the revealed preference of scientists to work on commercially relevant research does not mitigate the estimate of the gender gap. These results suggest that the conditions under which the gender gap arises are more compatible with a constraint-based explanation. By contrast, Ding and Choi (2011) made it a story of supply-side motivations. They analyzed the commercial activities of a sample of 6,138 university life scientists and found that the profiles of scientists who become academic entrepreneurs are different from those who become scientific advisors to companies. Consistent with prior research Murray and Graham (2007) found that women are much less likely to either found or advise companies. Specifically, female scientists are about one-fifth and one-third as likely as male scientists to become academic entrepreneurs and advisors, respectively. Although in both areas female scientists lag behind male scientists, the gender gap for advising, a less deviant and risky activity for university scientists, is about one-third narrower than the gender gap in Female scientists who venture into the commercial arena (e.g., patenting research discoveries) are more likely to come from the younger cohort (Ding *et al.*, 2006), which seems to be less hesitant at commercial engagement at an earlier career stage.

The risk level for entrepreneurial activities was also relevant for Haeussler and Colyvas (2011), who examined engagement in commercial activities such as consulting, patenting, and founding among more than 2,200 German and UK life scientists. They tested hypotheses that included individuals' attributes, their material and social resources, and perceptions about values and reputation. They found that characteristics reflecting professional security, advantage, and productivity were strong predictors of a greater breadth of participation in academic entrepreneurship, but not for all forms. Gender strongly influenced the probability of patenting and founding but not consulting. Male scientists were 8% more likely to patent and 4% more likely to found compared

to females. If consulting is considered the least costly form of commercial engagement, their results suggested that structural constraints on women are more relevant for forms that are riskier and demand a higher level of time and commitment.

Although women are less involved in starting companies, they are equally active in consulting. It is possible that the less binding activity of consulting may not affect the same elements that reproduce significant gender differences in academic science. Instead, Halilem *et al.* (2022) explained gender disparities in terms of demand-side arguments by focusing on consulting, the creation of consulting companies, and the revenues generated by consulting activities. They paired 406 female and male academics in business schools (203 of each gender from a sample of 729 academics) who shared common characteristics regarding academic position, subdisciplinary affiliation, and experience. Their results showed that, even compared to similar men, women are less involved in remunerated consultations, generate a smaller proportion of their revenue from consultations, and are less engaged in the creation of consultancy companies. This is in line with previous studies (Perkmann *et al.*, 2013; Tartari and Salter, 2015). The study revealed that most women follow a progressive path in their entrepreneurial journey, but a majority struggle to move from non-remunerated to remunerated entrepreneurial engagements. Moreover, the number of female academics decreases at each stage, from unremunerated consultation to the creation of a consulting company. The authors were therefore able to identify and quantify a leaky pipeline of both female and male academics with regard to their entrepreneurial engagement.

Finally, Tartari and Salter (2015) suggested that female academics engage less and in different ways than their male colleagues of similar status in collaboration with industry. They covered a broad range of industry engagement forms: creation of new physical facilities with industry funding, joint research agreements, contract research, consultancy, training of company employees, co-supervision of postgraduate students, attendance at conferences with industry and university participation, and attendance at industry-sponsored meetings. Although these results are consistent with prior work on the differences between male and female academics in relation to formal technology transfer, they enrich

our understanding of where and how these differences are manifested. In particular, by using a matching estimator, they showed that men and women of equal scientific, institutional, and professional status differ with regard to academic engagement with industry, with women appearing to take up joint research projects and consulting agreements less than men.

Finally, according to our search criteria, there was only one study that focused on noncommercial activities, that of Abreu and Grinevich (2014). They compared academic engagement in formal (license and spinout), informal (consultancy business, contract research), and non-commercial (informal advice, public lectures) activities between male and female academics. Their results showed that female academics were less likely than their male colleagues to engage in all types of entrepreneurial activities; however, the differences were larger for more informal activities. In particular, female academics are only 1% less likely than their male counterparts to create a spinout company, but 4% less likely to start a consultancy business, and 2% less likely to engage in contract research, provide informal advice, or give public lectures. As with age and career status, female academics were shown to have more difficulties in making industry and business contacts and commercializing their work. The authors framed the results in the literature by asserting that female academics are more risk averse (Stephan and El-Ganainy, 2007) and lack the experience and external contacts needed to effectively engage with external organizations (Ding *et al.*, 2006; Murray and Graham, 2007). The literature also found that female academics are under greater pressure to achieve tenure while balancing family demands and are less likely to have commercial experience or belong to networks that also include potential industrial partners, all of which can limit their potential for commercialization (Ding *et al.*, 2006; Murray and Graham, 2007).

5.3.3 Context

We identified three different layers in the academic context that influence entrepreneurial action: (i) the university and department levels, (ii) the

social network, and (iii) the national contexts. Table 5.7 summarizes the identified articles.

University Context

When considering academic entrepreneurship, affiliation with a university can be beneficial by itself (Bercovitz and Feldman, 2008; Clarysse *et al.*, 2011; Wennberg *et al.*, 2011). University resources and networks facilitate entrepreneurs in securing assets for the creation, growth, and success of academic spinoffs (Fini *et al.*, 2020). They are extremely helpful for academics who have few relationships with firms and other outside players, such as female academics (Civera and Meoli, 2023). At the same time, university affiliation can be beneficial in the eyes of external investors. In fact, according to Lauto *et al.* (2022), a parent university mitigates the greater levels of perceived uncertainty represented by female members in the founding team of an academic spinoff.

Notwithstanding the above, according to Muscio and Vallanti (2022), overall, women have a lower opinion about the entrepreneurial environment available to them at the parent institution than men. In their analysis of PhD students' perceptions of the barriers and drivers of entrepreneurship, all scores resulting from the survey were lower for female students than for males. In particular, female students found universities less supportive in providing professional support to potential entrepreneurs, offering training courses for entrepreneurs, and creating collaboration agreements with private companies.

In accordance with the more general literature on academic entrepreneurship, our literature review points out the relevance of support structures, such as TTOs, university incubators, ad hoc incentives, and specific programs for female academic entrepreneurship.

In their global analysis, Sugimoto *et al.* (2015) emphasized that female patenting is proportionally more likely to occur in academic institutions than in corporate or government environments. However, women's patents have a lower technological impact than those of men, and that gap is wider in the case of academic patents. They suggested that one way in which universities have responded to this is the creation of TTOs, which were established to meet the demands of the

Table 5.7: Articles on the role of context in shaping entrepreneurial action, distinguished by student and faculty entrepreneurship

	Student Entrepreneurship	Faculty Entrepreneurship
	<i>University context</i>	
TTOs		Rosa and Dawson (2006) and Sugimoto <i>et al.</i> (2015)
Incubators	Muscio and Vallanti (2022)	Dahlstrand and Politis (2013)
Ad hoc initiatives and policies	Jones (2015) and Muscio and Vallanti (2022)	Civera and Meoli (2023) and Tartari and Salter (2015)
Entrepreneurial education	Muscio and Vallanti (2022) and Epstein <i>et al.</i> (2022); Piva and Rovelli (2022)	Civera and Meoli (2023)
	<i>Social network context</i>	
Peer support	Muscio and Vallanti (2022, 2024)	Lauto <i>et al.</i> (2022) and Rosa and Dawson (2006); Tartari and Salter (2015) and Whittington and Smith-Doerr (2005)
Mentorship	Muscio and Vallanti (2022, 2024)	Civera and Meoli (2023) and Ding <i>et al.</i> (2006); Murray and Graham (2007) and Tartari and Salter (2015)
Research centers		Gaughan and Corley (2010)
Family and neighbors	Markussen and Røed (2017)	Gaughan and Corley (2010)
	<i>National context</i>	
	Gupta <i>et al.</i> (2022) and Ng <i>et al.</i> (2016)	

US Bayh-Dole Act in promoting the commercial exploitation of inventions resulting from government-funded research (Abreu and Grinevich, 2014). Starting in the US and then around the world, there has been a tenfold increase in the number of TTOs at universities following the Bayh-Dole Act (Grimaldi *et al.*, 2011); this might explain the increase in the proportion of women inventorships in recent decades. Strong TTOs have been suggested as another approach to fostering academic entrepreneurship through organizational support and facilitating the construction of collegial networks (Ding *et al.*, 2006). They may also lead to reduced perceptions of risk, which has been shown to have gendered dimensions (Duch *et al.*, 2012).

The salience of TTOs was also reported in Rosa and Dawson's (2006) report, in which female academics who were interviewed specifically mentioned the failings of their university's TTOs in supporting female academic entrepreneurship, resulting in an obstacle to the commercialization process. The shortcomings of a TTO might be viewed as less critical if the entrepreneur did not rely on the TTO as a major source of advice and information. Male respondents, for example, reported having established contacts with other academic entrepreneurs as a precursor to spinning out their own companies, whereas very few female respondents had done so.

As an alternative support infrastructure, Dahlstrand and Politis (2013) examined the significance of university incubators for the promotion and development of women's academic business start-ups. The size of the incubators was positively related to venture survival for both women's and men's ventures but not for women-led ventures based on university research. One of the characteristics that benefits them was the time spent in incubators, which positively contributed to both the survival and growth of women-led ventures, including academic spinoffs.

Organizations can also help overcome the gender gap in entrepreneurial activities by implementing proactive measures, such as formal commitments, to reduce the barriers faced by socially excluded groups. In more extreme cases, employers may operate quota or set-aside programs to help individuals from disadvantaged groups perform in their job roles (Tartari and Salter, 2015). By providing resources and support to women at the formative and later stages of their careers, these

programs provide an important institutional mechanism to support female academics in different aspects of their jobs. These efforts may help enrich and broaden the range of skills of female academics. Tartari and Salter (2015) provided different examples of such programs. For instance, Imperial College London provides funding of up to 50% of the salary of one year for women returning from maternity leave to relieve them from all teaching and administrative duties upon their return. This type of support can provide opportunities for women to renew contacts with potential industry partners after a period of absence, or even spur new collaborations. As such, these programs and efforts may encourage female academics—whether as part of a proactive measure or not—to take on boundary-spanning roles. In addition, these programs may help increase the attractiveness of an employer to minority groups, making them more likely to join the organization. Together with anecdotal evidence, the authors provided empirical evidence of the critical importance of an organizational-level commitment to women’s scientific and engineering careers in shaping women’s industry engagement efforts. They found that the difference between men and women in engagement efforts is present only in organizations with no significant formal commitment to supporting women in science and engineering academic careers.

In the same vein, Civera and Meoli (2023) suggested that one of the reasons why female-led academic spinoffs perform better than female-led nonacademic startups lie in educational and training programs. Such programs are aimed at increasing research funding and helping increase their exposure to industry practice while promoting skills and competencies that allow women in particular to acquire adequate human capital to pursue an entrepreneurial career (Piva and Rovelli, 2022). Piva and Rovelli (2022) found that when STEM students attended courses in economics and management, the gender imbalance in their propensity to become entrepreneurs diminished. The authors argued that these types of courses allow female students to better estimate the positive returns from a potential entrepreneurial activity. This positive role of participating in an educational program was confirmed by Epstein *et al.* (2022). The students reported no significant difference in terms of the commercialization readiness of their project between

women and men, but a significant increase after the completion of the training, which includes mentoring activities. These programs may provide female academics with greater confidence to engage outside the university with nonacademic communities, concurring with the empowerment of female academics. Yet, according to Rosa and Dawson (2006), whereas male academic entrepreneurs have, either alone or with their cofounders, attended courses on setting up new business enterprises, only one female respondent to their interview attended such a course; this points out a difference in course attendance that still exists.

The way in which entrepreneurship courses are designed must be taken into consideration. Thus, in the work of Piva and Rovelli (2022), special attention is given to internships, which is considered a relevant educational activity that could foster entrepreneurial attitudes. However, the findings suggested that all the students who took part in an internship were less likely to become entrepreneurs after graduation than those who did not. Furthermore, this negative relationship was stronger for women. The authors suggested that in this case, an internship favors the chance of finding the first job, thereby reducing the likelihood of becoming an entrepreneur. With respect to the results for females, one potential explanation is that since the labor market usually discriminates against female STEM graduates, if the internship supports finding a job, their chances of becoming an entrepreneur are even more reduced.

Social Context

By analyzing entrepreneurship among PhD students in Italy, Muscio and Vallanti (2022) found that university policies for entrepreneurship are equally important for men and women. What really seems to matter for women's success in starting a business is the opportunity to engage with same-sex role models during their studies. The authors' results suggested that women who attended universities in which the faculty gender balance was more favorable to women were likelier to successfully establish a business venture. In a study conducted in 2024, the same authors statistically tested the role of gender balance on students' entrepreneurial behavior by using original data from a large survey

of 9,062 PhD graduates in Italy between 2008 and 2014 (Muscio and Vallanti, 2024). They observed that female students' interest in business creation and their attitude toward entrepreneurship are significantly affected by the opportunity to study and conduct research in a gender-balanced environment where they can engage with, be inspired by, and be guided by same-sex peers. These conditions mitigate gender differences and help women catch up with men in business ventures and startup activities.

The evidence provided by Muscio and Vallanti (2024) was also supported by Tartari and Salter (2015). To better understand how social context moderates the differences between men and women with respect to academic engagement with industry, the authors focused on the work setting. They drew from tokenism, which in the field of psychology is a situation in which a member of a distinctive category is treated differently from other people. They explored the effect of the presence of women in the local workplace as an important contextual factor, suggesting that a low number of women in the workplace may heighten the engagement gap. The low number of women in the local context may make it difficult for women to access the means and resources to exploit industry relationships effectively. In addition, as a result of tokenism, women may be assigned work roles that do not enable them to gain access to useful and valuable industrial contacts.

In academia, female academics are thus asked to take on ceremonial tasks, such as being the only female member of a committee (Etzkowitz *et al.*, 2000) or additional service responsibilities, including pastoral care for students (Wolfinger *et al.*, 2009). In addition, many women's academic careers do not follow the conventional career pathway, and with some women in the local context, there may be a tendency among male-dominated hiring and promotion panels to fail to give credit or disregard women's contributions (Van den Brink and Benschop, 2014). In taking up these roles, women may find that they have difficulty obtaining credit for their contributions from internal and external audiences. The lack of women in the local context also means that women are liable to be short of female role models or mentors to help them deal with the challenges associated with industry engagement. This is even more apparent in fields with very few women (Tartari and Salter, 2015).

In contrast with the traditional setting of university departments, Gaughan and Corley (2010) suggested focusing on university research center affiliation; since research centers are more recent institutional structures organized to increase the number of women, they may create more gender-neutral institutional settings. Moreover, in research centers, faculty researchers engage in a wide variety of activities with industrial partners (Corley and Gaughan, 2005). In research centers, no variation has been found in men's and women's ability to get grants or in grant amounts (Bozeman and Gaughan, 2007). Moreover, they are equally engaged in consulting, joint publishing, and routine scientific communication (Corley and Gaughan, 2005).

Support from peers is fundamental not only for academic spinoffs but also for patenting. Whittington and Smith-Doerr (2005) pointed out that women receive less support and research attention from their universities, departments, and scientific discipline than their comparable male colleagues. The role of mentoring is explicitly mentioned in relation to patent activity, especially among young faculty. Younger cohorts tend to patent more than senior female professors. Increasingly, young female faculty members are similar to their male colleagues in the sense that they view patents as accomplishments and as a legitimate means to disseminate research (Ding *et al.*, 2006). Gender differences remain significant among junior faculty, but Murray and Graham (2007) found their decline prompted by greater gender equality in advisor mentoring, which has started to reshape the supply side of commercial science. Their evidence suggests the powerful role of gender-neutral PhD mentoring for young faculty from commercially active advisors as a mechanism that undermines the enduring disadvantages accumulated by female faculty.

It is thus well established in the literature that male and female entrepreneurs receive different types of support. As demonstrated by Rosa and Dawson (2006) during their interviews, male respondents reported having established contacts with other academic entrepreneurs as a precursor to spinning out their own company. On the other hand, only a couple of female respondents did so, and other women reported that, to their knowledge, neither they nor any of their company's cofounders had done so. In general, male respondents tended, on average,

to agree with the statement, “Many people offered me help or advice on how to fulfill this role.” Female respondents, on average, neither agreed nor disagreed, perhaps suggesting lower levels of assistance from their social network resources in this respect.

Differences in social networks between males and females play a role not only in starting a company but also in the company’s subsequent performance. Lauto *et al.* (2022) showed the importance of including full professors among shareholders. This can operate as a positive voluntary signal that can offset the involuntary negative signal sent by the presence of women in share ownership. The impact is positive but small and somewhat redundant for all-male companies; it grows along with the percentage of shares in the hands of female shareholders, and it reaches the highest level for all-female companies.

The entrepreneur’s social capital is not limited to the university environment. Markussen and Røed (2017) found that early career entrepreneurship is strongly affected by existing entrepreneurship activities among family members, neighbors, and schoolmates. Moreover, these influences are heavily gendered in the sense that men are more influenced by other men, and women are more influenced by other women.

National Context

The argument can also be extended to the national level. Ng *et al.* (2016) argued that their findings about the advantages of Chinese female students over their male counterparts is related to the particular context of China. Thus, in China, personal relationships and social networks are key variables for entrepreneurial success (Ng *et al.*, 2016). Female *wei-shangs* were able to earn customers’ trust and loyalty by tapping into their social networks. This approach, effective in China, can be traced back to feminine characteristics, with consequent competitive advantages from the women’s side. Gupta *et al.* (2022) enlarged the debate on masculinity and femininity in entrepreneurship by analyzing two different cultural contexts: the US and India. To examine the perceived similarity in characteristics ascribed to entrepreneurs in general and characteristics ascribed to men and women, they collected data on 323 working professionals and 171 business students in India, as well as

on 186 American working adults and 271 business students, respectively. Conventional wisdom suggests that entrepreneurs are typically associated with masculine attributes (Guzman and Kacperczyk, 2019) and that entrepreneurship is seen as a male-typed activity (Thébaud, 2015). They found that, as is generally described in the academic literature (Jennings and Brush, 2013), entrepreneurship is male-typed in the US sample. In contrast, in India, entrepreneurs are perceived as having characteristics and qualities of both men and women. The androgynous picture of entrepreneurs in general that we found in India challenges the notion that feminine terms are either absent from the words used to describe entrepreneurs or the opposite of such words (Ahl, 2006).

5.3.4 Summary

Section 5.3 examines gender differences in entrepreneurial action among university students and faculty. It highlights that male students and faculty are generally more engaged in entrepreneurial activities than their female counterparts, with key barriers for women including risk aversion, lower self-confidence, limited networks, and societal stereotypes. Female entrepreneurs often excel in niche areas, such as sustainability-focused ventures or female-oriented markets.

Institutional factors, such as university support structures, technology transfer offices (TTOs), and entrepreneurial education, play a significant role in shaping outcomes. However, these resources often inadequately address the unique needs of women. Social networks, mentorship, and exposure to role models are identified as critical enablers, particularly in gender-balanced environments. National cultural contexts also influence perceptions of entrepreneurship, with gendered biases more pronounced in some countries than others.

Section 5.3 emphasizes the importance of targeted interventions, such as specialized training, support programs, and policies promoting inclusivity, to bridge gender gaps and foster equitable entrepreneurial participation and success.

6

Discussion and Conclusion

In this section, we highlight gaps in the extant literature and discuss promising directions for future research. We first elucidate the directions for future research, which are general in nature, and then examine them according to the three entrepreneurial phases: mindset, intention, and action.

In the recent literature on academic entrepreneurship, gender differences have received relatively little attention as a focal topic. Many studies in this body of literature have thus considered gender as a control variable and extrapolated general patterns from it (Hmieleski and Powell, 2018), making it very difficult to generalize the results (Poggesi *et al.*, 2020). There are, therefore, several limitations in both extant theories and empirical evidence that offer possibilities for future directions in research.

The lack of a theoretical foundation may derive, according to Hmieleski and Powell (2018), from the nature of the literature on academic entrepreneurship in general, which traditionally encompasses studies that have been phenomenon- and/or data-driven (Djokovic and Souitaris, 2008). In practical terms, this is demonstrated by the fact that only a small number of the studies examined mediating and/or

moderating variables—common indicators of theoretical sophistication (Whetten, 1989).

According to Poggesi *et al.* (2020), the reason for this can be found in mainstream women's entrepreneurship literature in particular. This body of literature does not make explicit reference to the social dimension of gender, thus missing an important opportunity to overcome the historical dichotomy between women and men (Civera and Meoli, 2023; Gupta *et al.*, 2022). The main limitation of this approach is its consideration of gender and sex as synonyms. In the reviewed articles, the gender as a concept is often implied rather than explicitly addressed in the theoretical sections, indicating a lack of attention to the theorization of gender in the research. Another limitation of this approach to gender and the lack of theorization in the academic entrepreneurship literature is its failure to move beyond the binary conception of gender as either male or female. This binary view aligns with the conflation of gender and sex, a perspective that has been criticized by the more critical studies within the entrepreneurship literature (Tedmanson *et al.*, 2012). Instead, as postulated by poststructuralist feminism, gender is socially constructed; thus, individuals, regardless of their biological sex, can be characterized by both masculine and feminine traits, and entrepreneurial behavior is determined by the combination of these two components. This approach has not been frequently used in the entrepreneurship literature, with the relevant exceptions of Gupta *et al.* (2009) and Goktan and Gupta (2015), and Hechavarria and Ingram (2016). Gupta *et al.* (2009) studied the effects of socially constructed gender stereotypes on the entrepreneurial intentions of male and female young adults in three countries.

Entrepreneurship has masculine characteristics for both men and women, and women do not differ in their entrepreneurial intentions whenever they perceive themselves to be similar to males. Goktan and Gupta (2015) introduced the concept of androgyny as an equal endorsement of both masculine and feminine identity and found that androgynous individuals have higher levels of IEO in comparison to just feminine or masculine individuals. Hechavarria and Ingram (2016) applied the concepts of masculinity and femininity to the propensity to

engage in commercial and social entrepreneurship. Social entrepreneurship is positively related to femininity; however, in a society dominated by masculinity, women are less inclined than male entrepreneurs to pursue social organizational structures. In light of a more complete meaning for gender, there is an increasing claim for greater adoption of poststructuralist feminism to highlight the importance of the social embeddedness of women's entrepreneurship (see Ahl, 2006; Hughes *et al.*, 2012). This has yet to be addressed.

In this sense, a first step toward overcoming theoretical limitations is suggested by this review. Studies on female student entrepreneurship partly encompass social theories, such as SRT and the gendered entrepreneurship perspective (Shinnar *et al.*, 2018; Gupta *et al.*, 2022). Adopting these lenses can certainly be beneficial in advancing the knowledge of female entrepreneurship among faculty members. On the other hand, it is evident that student entrepreneurship is understudied in general, as we found few articles on the topic with regard to gender when nascent entrepreneurship literature was excluded. The topic also deserves more investigation from a gendered perspective.

In addition, limitations in empirical research may inspire future studies. A major concern is related to the methodological approach. According to Whittington and Smith-Doerr (2005), measures of outcome alone cannot speak to individuals' motivations and interests in entrepreneurial engagement or their opportunities to become involved. Without qualitative interviews or more detailed data, we cannot know the extent to which differences in men's and women's academic entrepreneurship arise from issues of unequal access to resources, differences in structural locations or job types, or individual choices. On the other hand, as pointed out by Poggesi *et al.* (2020), most studies based on interviews rely on small samples. Accordingly, there is a need to adopt larger samples.

Another source of incomparability arises from the fact that most of the studies that compare men and women have focused on technologically oriented disciplines and the formal commercialization of science, where the representation of women is significantly lower at both the student and academic levels (Hill *et al.*, 2010; Blume-Kohout, 2014).

Scholars have studied gender disparities in engineering fields (Blume-Kohout, 2014), medicine (Colyvas *et al.*, 2012), the life sciences (Ding *et al.*, 2013), or, more generally, STEM fields (Sohar *et al.*, 2018; Blume-Kohout, 2014; Sinell *et al.*, 2018). Indeed, STEM fields are important sources of innovation and technology (Kuschel *et al.*, 2020; Bianchi and Giorcelli, 2020). Moreover, as pointed out by Halilem *et al.* (2011), researchers in the natural sciences and engineering are those with the most diversified portfolio of entrepreneurship outcomes, which makes them interesting cases for studying formal commercialization. However, an emphasis on these disciplines when studying gender disparities is problematic for at least two reasons. First, women represent fewer than half the faculty in several disciplines (Slate and Harris, 2017); their presence is especially low in engineering and some technology fields (Tartari and Salter, 2015).

An emphasis on the disciplines in which women are underrepresented could thus exacerbate the unbalanced nature of the demographics of female and male academics. Second, among non-technology disciplines in which women are more numerous, the study of some research fields also presents interesting insights for academic entrepreneurship and innovation development. For instance, academics in business-orientated fields are important actors in local, regional, and national systems of innovation (Etzkowitz *et al.*, 2019). Business Schools (BS)' professors have not only emphasized EE but have also fostered academic entrepreneurship in other research fields (Hayter *et al.*, 2018). For example, a study by Goethner and Wyrwich (2020) showed that knowledge flows between BS and life science researchers represent important sources of science-based and technology-oriented business ideas. Moreover, BS faculty could be as involved in entrepreneurship as those in technology fields (Amara *et al.*, 2016). However, while researchers in technology rely more on IP-based entrepreneurship (Halilem *et al.*, 2017), BS researchers are more oriented toward knowledge-based commercialization, such as consultancy services (Wright *et al.*, 2009). In this regard, Amara *et al.* (2016) showed that BS researchers offer a wide range of value-adding services and expert advice to companies.

Academic entrepreneurship in the field of business contributes to the development of companies' customer value propositions, their market

segment positioning, or their revenue-generating mechanisms. Consequently, most studies on gender disparities in academic entrepreneurship have focused on technology-oriented disciplines, such as engineering and health sciences (Rosser, 2012; Carrigan *et al.*, 2017), the IP-based commercialization of science through patenting (de Melo-Martín, 2013), licensing (Colyvas *et al.*, 2012), or spin-off creations (Rosa and Dawson, 2006). Nevertheless, scholars have called for more research on non-technological fields (Alonso-Galicia *et al.*, 2015) and on the non-IP-based commercialization of science, as little is known about the gender disparities in the informal commercialization of science (Tartari and Salter, 2015). Thus, exploring gender disparities in non-STEM disciplines in which women are more represented will contribute to advancing knowledge of the differences between female and male academics with regard to their informal academic entrepreneurship.

Most of the selected literature has been investigated by authors affiliated with Europe and the US. Including Canada and Australia in the group, 86% of the articles were represented. Interestingly, countries such as China, Japan, and the Republic of Korea are almost absent in the identified corpus of studies, even less than those from the Middle East. Future research should address this gap and extend the investigation to the areas less represented and, in particular, provide comparisons across different contexts. With respect to our framework, we observed that studies in the “intention” phase are increasing, with around 75% of the literature published in the last 10 years. This result might be related to several factors, such as the increased attention of universities and stakeholders to the education of entrepreneurs, including related entrepreneurial skills, and improved access to data from primary sources (e.g., GUESSS).

Furthermore, there is room for extending studies that address the role of “mindset” among faculty and with respect to the general context. Similarly, the “intention” phase appears to be extensively studied for students, while very few articles focus on the mechanisms for faculty members. In contrast, the “action” phase has been addressed by scholars mainly considering faculty and the role of context, while little evidence has been produced for students so far. In general, there are few studies that take a qualitative approach, especially for the “intention” phase

and the faculty group. Furthermore, the “intention” and “mindset” phases could benefit from additional studies that combine primary and secondary data, for example, to triangulate the results from surveys with other sources.

6.1 Mindset

Regarding the entrepreneurial mindset, a key limitation identified in this review is the lack of consensus on its definition and the use of the term “mindset” in the existing literature, as described in Section 2.1. This issue also extends to the literature on gender differences in the academic entrepreneurial mindset. To better understand gender differences in the formation and expression of the entrepreneurial mindset, further conceptualization is needed to clearly define the dimensions that comprise this mindset.

Furthermore, the domain of academic entrepreneurship requires a critical review of the literature focusing on a singular, ideal entrepreneurial mindset. This is important for developing entrepreneurial inclinations and successful careers with a social constructionist perspective on gender and feminist theories. Critical perspectives on entrepreneurship have highlighted the tendency in scholarship to rely on normative assumptions, such as the idea that entrepreneurship is inherently beneficial for economic action and wealth creation (Weiskopf and Steyaert, 2009). This perspective often privileges certain forms of economic activity while marginalizing more collective forms of organization and exchange as problematic or unimportant. Similarly, critiques have been raised about the tendency to define a single ideal way to be a successful entrepreneur, typically based on characteristics and standards that favor a white male archetype, thereby excluding other entrepreneurial identities (Calás *et al.*, 2009; Tedmanson *et al.*, 2012). As a starting point, future research should consider discussing “mindsets” rather than a singular “mindset,” incorporating these critical perspectives and recognizing the need for differentiation.

To achieve this, a deeper understanding of how the university context shapes entrepreneurial mindsets and gender differences is needed. Organizational research has adopted a gendered perspective that moves

beyond essentialist views of gender identities and differences, recognizing that gender inequalities are systemic and often embedded in the structures and practices of organizations. Gendered organization theory and various feminist perspectives have been applied to universities, both generally and within specific contexts, such as STEM, to understand how systemic inequalities are shaped and perpetuated within the academic environment, affecting both students and researchers (Benschop and Brouns, 2003; Bird, 2011).

While some studies on gender in entrepreneurship have begun to move away from a context-neutral view of gender differences in entrepreneurial careers (Ahl and Marlow, 2012), these approaches have yet to significantly influence the literature on academic entrepreneurship. As discussed in previous sections, there has been an attempt to examine gender differences in academic entrepreneurial mindsets from an organizational perspective, as seen in Jones' (2014, 2015) work. Future research should build on this perspective by aiming for comparative theorizing between entrepreneurial literature and organizational literature on gender inequalities, or by drawing from the extensive literature on gender differences in university trajectories that considers the role of university context and climate.

A notable limitation in the review of the entrepreneurial mindset literature is the lack of focus on the faculty level. Most of the reviewed studies concentrated on gender differences in students' development of the entrepreneurial mindset. One hypothesis for this trend is the relative ease of collecting data on students' entrepreneurial mindset and motivation through local EE experiences or large-scale surveys, such as the GUESSS survey, at an international level. Another reason could be that the literature on faculty entrepreneurial mindset is overshadowed by the more extensive literature on entrepreneurial action. Despite this, we emphasize the need for greater attention to the nuances of developing entrepreneurial mindsets at the faculty level and the different gendered effects that may arise from this process.

6.2 Intention

The studies focusing on entrepreneurial intention and gender present different limitations that future studies need to assess to further develop knowledge concerning the gap between women and men in the formation of entrepreneurial intentions.

The studies on entrepreneurial intentions have been mainly focused on testing the theory of Planned Behavior (Ajzen's, 1991) assessing the moderating or mediating effect of gender. However, there is room for more studies that look at the contingencies elements that may affect the formation of intention. First, the role of the general context should not be overlooked. More studies need to assess the structural and social environment in which individuals are embedded, how such aspects affect the process by which individuals form entrepreneurial intentions, and the differences that emerge between men and women. In particular, only a few studies (e.g., Shneor *et al.*, 2013) have analyzed the role of different cultural aspects on entrepreneurial intention formation. To better understand gender differences in the entrepreneurial context, a deeper understanding of how cultural aspects shape the formation of entrepreneurial intention is needed.

Second, there is a need to examine gender differences in entrepreneurial intention formation from an organizational perspective more systematically. In particular, most of the studies in the review have focused on assessing entrepreneurship education's role on intention formation among students and how the impact of such education differs between men and women (e.g., Shinnar *et al.*, 2014). Future research needs to build on a broader perspective by assessing the role of university context and climate in fostering entrepreneurial intentions among students.

Third, some recent studies (Donaldson *et al.*, 2023; Dickel and Eckardt, 2021; Lopes *et al.*, 2024) put forward the idea of different kinds of entrepreneurial intentions by distinguishing between social and general intentions. These studies suggest that gender differences exist; for example, women are more inclined towards social entrepreneurship due to their values aligning more closely with the principles of social entrepreneurship than other types of entrepreneurial intentions. Future

studies could build upon these differences to provide a fine-grained perspective in academic entrepreneurship and, in particular, of differences between men and women. Moreover, such studies might highlight important results in terms of policy, regulations, and entrepreneurship education inside universities.

Finally, as for the literature on mindset, a notable limitation in the intention literature is the lack of focus on the faculty level. Indeed, most studies on gender differences study how students form entrepreneurial intentions. As shown in the review, most of the literature at the faculty level has been focusing most on understanding entrepreneurial action and less on the antecedents of the actions per se. However, we emphasize the need for more work and attention to the antecedents of entrepreneurial action. In particular, it would be interesting to collect longitudinal data assessing the entrepreneurial intention and the actual business behavior by looking at specific moderators that can inhibit or support the case of female academics in translating entrepreneurial intentions into a new venture.

6.3 Action

Regarding entrepreneurial action, it is evident that student entrepreneurship and faculty entrepreneurship were studied differently from both a gender and a more general perspective. It is undeniable that the action dimension in student entrepreneurship is understudied in general, as we found few articles on the topic. It is even more so when considering the gender perspective. Therefore, the topic deserves more investigation. Moreover, studies on student entrepreneurship relies more on theoretical than empirical research. In particular, student entrepreneurship has been studied in the light of social theories, such as SRT and the gendered entrepreneurship perspective (Shinnar *et al.*, 2018; Gupta *et al.*, 2022). Adopting these lenses can certainly be beneficial in advancing the knowledge of female entrepreneurship among faculty members. On the other way round, faculty entrepreneurship is mainly characterized by empirical research and their theoretical grounding is limited.

More specifically, to shed further light on female academic entrepreneurship, future research should address women's entrepreneurial

strategies. Female entrepreneurs have historically been defined as not growth oriented (e.g., Orser and Hogarth-Scott, 2002). However, the most current research has clearly pointed out that not being growth-oriented is not just a female entrepreneurs' issue but, rather, an issue associated with small business owners in general (Jennings and Brush, 2013). The verified differences in terms of performance between male-owned firms and female-owned firms, and the non-convergent results obtained after controlling for specific business characteristics, have been shown to be either the results of inappropriate performance measures or the scant (or absent) consideration of noneconomic results (e.g., Robb and Watson, 2012). Within this framework, it could be interesting to analyze how established female entrepreneurs define their success and how such a definition differs from that of male entrepreneurs.

Over the years, many scholars have pointed out that women are pushed into entrepreneurship through the necessity, for example, of finding a more flexible solution to combine work and family responsibilities (necessity-driven factors, e.g., McGowan *et al.*, 2012). Nevertheless, in addition to motives of necessity, entrepreneurship may still attract women through opportunity-based factors. Interestingly, no consensus regarding which factor exerts the greatest influence has as yet emerged, and the most current theoretical findings clearly stress that the push/pull motives rarely exclude each other (e.g., Kirkwood, 2009). Moreover, as the relevance of motherhood for female entrepreneurs grows (Whittington, 2011), future research should focus on the work-family conflicts experienced by women entrepreneurs. Although this topic is also under-investigated in the more traditional research on women's entrepreneurship (e.g., Poggesi *et al.*, 2020), it is generally listed as one of the main reasons for women-led firms' underperformance compared to men's firms.

Finally, to better understand the phenomenon we investigated, the context should not be overlooked. Future studies should enhance the analysis of the socioeconomic context in which women-led firms are grounded. A more thorough understanding of a country's family and economic policy, labor market, social norms, and culture can also be beneficial for developing comparative studies between and among different countries. Within the specific context of academic entrepreneurship,

the characteristics of universities, departments, and disciplines deserve attention. In addition to those already investigated, which require additional analysis to be validated and better understood, potential aspects to be considered are entrepreneurial courses, life-long learning programs, and institutional policy instruments, such as the gender equality plan.

In addition, limitations in empirical research may be of inspiration for future studies. A relevant threat is the adoption of methods with limited potential and questionable relevance for comparison with male academics (Halilem *et al.*, 2022). This is especially true when scholars have compared samples of minorities of female academics with larger groups of their male counterparts for whom general demographics, career advancement, or distribution amongst disciplines/departments are different (Tartari and Salter, 2015). For instance, Whittington and Smith-Doerr (2008) compared a sample of 308 female academics (32%) with 654 male academics. Ding *et al.* (2006) compared a sample of 903 female academics (21%) with a group of 3324 male academics. Colyvas *et al.* (2012) compared a sample of 161 female academics (14%) with 927 male academics, and Thursby and Thursby (2005) compared a sample of 360 female academics (8%) with a group of 4140 male academics. These studies have led to exaggerated assessments of gender gaps between female and male academics (Lincoln *et al.*, 2012; Tartari and Salter, 2015).

This monograph is particularly relevant to the fields of economics, entrepreneurship, and management. In economics, it contributes to the understanding of the factors that influence entrepreneurial activity and economic growth. In entrepreneurship, it sheds light on the barriers to and facilitators of entrepreneurial activity, particularly for women. In management, it provides insights that can inform policies and practices to promote gender equality in academic entrepreneurship.

Our work is not exempt from limitations. First, we applied a narrative review approach in selecting and examining the literature. Our aim was not to systemically cover the entire body of literature but rather to provide an organic scheme around the main findings and research stream in the setting of academic entrepreneurship and gender analysis. Furthermore, we do not claim that our conceptual framework is the only suitable framework for classifying this body of literature;

however, the combination of the three entrepreneurial phases for the three university subjects (i.e., students, faculty, and context) provided a classification reference in which the examined articles were coherently allocated. In only a very few cases did a single study address multiple phases/subjects. Finally, as previously mentioned, future research could further distinguish and characterize the studies according to the use of gender or sex.

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