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# How entrepreneurial role models impact on entrepreneurial outcomes: A gender perspective

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## ABSTRACT

This paper examines whether male and female students respond differently when exposed to predominantly masculine or feminine role models. Drawing on Social Cognitive Career Theory, we explore if the exposition of individuals to entrepreneurial role models can significantly influence their entrepreneurial outcomes in terms of entrepreneurial intentions (EI), entrepreneurial self-efficacy (ESE) and entrepreneurial learning (EL). We collected data from 106 engineering students attending an entrepreneurial program in 2019/20 with an exposition to a prevalent male entrepreneurial role model, and from 88 engineering students attending the same program in 2022/23 where the exposition was a prevalent female entrepreneurial role model. A pre- and post-course survey was run in both years to measure differences in ESE, EI and EL. Results reveal a gender effect in EI, as female role models boost female students' confidence and improve their intention to start entrepreneurial activities. EL increased independently by the gender. Finally, female role models impact the ESE of female students, while male role models impact both. This research extends intention-based analysis by incorporating gendered structural barriers, shedding light on their demonstrable influence on entrepreneurial outcomes.

## 1. Introduction

Entrepreneurship is a critical driver of economic growth in all countries (Urbano et al., 2019). The percentage of men who engage in entrepreneurial activities remains higher (e.g., Mozahem, 2021; Meyer et al., 2017). So far, entrepreneurship is still seen as a predominantly male profession (Donaldson et al., 2023; Shinnar et al., 2018). But why women entrepreneurial entry rate is still lower than men? Some studies reported a different ability to recognize opportunities between men and women (e.g., Donaldson et al., 2023). Research findings on entrepreneurship have shown that men have a greater predisposition to engage in entrepreneurial activity than women (e.g., Shinnar et al., 2018), and this gap has often been attributed to differences in how men and women perceive the environment for entrepreneurship and their abilities to succeed (Santos-Jaén et al., 2022). In this vein, we need further investigation of embedded social cognitive associations that frame entrepreneurship as a masculine concept (Marlow & Martinez Dy, 2018) and of factors that influence the decision to pursue nontraditional careers that bring men more than women to become entrepreneurs. We started from the Social Cognitive Career Theory (SCCT- Lent, Brown, & Hackett, 2000) to study the influence of context upon an individual's career intention (Belchior & Lyons, 2022), and to understand if role model in an educational setting may have an impact on women's entrepreneurial career choice. In this regard, a major stream of entrepreneurship research that focuses on the design of Entrepreneurial Education (EE), content and effects (Fayolle, 2018) argues that access to courses focused on entrepreneurship

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increases the likelihood of starting a business (e.g., Breznitz & Zhang, 2020; Rippa et al., 2020) or entrepreneurial outcomes (e.g., Almeida et al., 2021; Klapper & Farber, 2016). Recent literature strongly related to EE has focused on the entrepreneurial role model, seeking to understand the impact of their inclusion within university courses (Abbasiachavari & Moritz, 2021). Entrepreneurial role models can be successful entrepreneurs who bring their testimony within entrepreneurship courses, facilitating learning by example and increasing students' Entrepreneurial Intention (EI), Entrepreneurial Self-Efficacy (ESE), and Entrepreneurial Learning (EL) (Bosma et al., 2012; Passavanti et al., 2023; San-Martín et al., 2022). According to Bosma et al. (2012), the effect can be amplified during learning activities when similarities in nationality, age, and gender occur between role models and observers. However, the effect of role models with similar characteristics has been studied mainly within family and peer contexts but not in educational settings (Abbasiachavari & Moritz, 2021). Several works suggest the inclusion of female role models in educational environments to remove the negative effects of stereotypes and to increase the effectiveness of entrepreneurship courses in terms of increasing students' entrepreneurial outcomes (Mozahem, 2021). Other studies have investigated if the similarity (gender, race, and nationality) between individuals and their role models in EE affects entrepreneurial behavior (Byrne et al., 2019). Current literature analyzing entrepreneurial role model is particularly focused on different types of role models (*whom*), at which stage of life (*when*), and in which context the exposure to role models occurs (*where*) (Abbasiachavari & Moritz, 2021).

Therefore, this research aims to investigate if exposure to a prevalent male role model presents differences from exposure to a prevalent female role model and if males and females behave differently based on the type of exposure. We built our research on SCCT and hypothesize that EI, EL, and ESE will increase when there is a gender match between students and entrepreneurial role models. In this context, 'gender' refers to socially constructed roles, behaviors and identities of female, male, and gender-diverse people (Coen & Banister, 2012).

The paper's structure starts with a review on how entrepreneurial role models have been adopted in entrepreneurship courses, showing how the related gender perspective has been studied in the literature. After that, we structured an experimental design involving master's degree engineering students to test our hypothesis. Insights from the field research provide evidence for discussion and theoretical and practical implications in terms of planning and execution of entrepreneurial program and education.

## 2. Research theory

### 2.1. Entrepreneurial role models in education: gender perspectives and influence on student entrepreneurship

Despite the increase in women entrepreneurs over the years, the percentage of men who decide to engage in entrepreneurial activities remains higher in many countries (e.g., Meyer et al., 2017; Mozahem, 2021). Many studies show that women's lower entrepreneurial entry rates than men are unrelated to a different ability to recognize opportunities (e.g., Donaldson et al., 2023). According to the literature, this is related to several reasons. One of the reasons that might reduce women's propensity to choose entrepreneurial careers is associated with some typical female personality traits and self-perceptions such as extroversion, self-confidence, and personal relationships (e.g., Donaldson et al., 2023; Piva & Rovelli, 2022) as well as lower risk aversion than men (e.g., Gimenez-Jimenez et al., 2022). Other reasons include a cultural and institutional context due to gender stereotypes (e.g., Dilli & Westerhuis, 2018). Women believe they have fewer skills and competencies in general due to stereotypes about gender roles, especially in entrepreneurship (Shinnar et al., 2018; Nowiński et al., 2019).

Research has demonstrated that people's decisions are often shaped by the ideas and actions of those around them (Ajzen, 1991), including people's occupational choices (Douglas & Shepherd, 2002). Even in the entrepreneurial context, observing others positively (e.g., Krueger et al., 2000) motivates more people to start their businesses. These "others" can be entrepreneurs of different types, such as celebrities, friends, colleagues, or family members, and can be understood as entrepreneurial role models (Bosma et al., 2012). Role models can be defined as individuals who can stimulate or inspire others on certain decisions and serve as examples (San-Martín et al., 2022). Research has demonstrated that the availability of role models within academic institutions significantly enhances the propensity of students to develop entrepreneurial attitudes (Fellhofer & Puumalainen, 2017). Toledano and Urbano (2008) state that the development of entrepreneurial attitudes in students is significantly influenced by the presence of entrepreneurial role models in entrepreneurship courses. Hence, integrating successful entrepreneurs as role models into university curricula or facilitating interactions with local entrepreneurs can profoundly impact students' entrepreneurial behaviours (Toledano & Urbano, 2008; Abbasiachavari & Moritz, 2021). Indeed, there is consensus about the fact that role models influence students' decisions to pursue entrepreneurship and further develop their business ideas (San-Martín et al., 2022). In entrepreneurship courses, the inclusion of role models increases students' desire to become entrepreneurs because role models focus on creating a company, stimulating motivation and skills to develop successful entrepreneurial work (San-Martín et al., 2022). The main function of a role model is to facilitate learning by example, while learning by support, increasing self-efficacy and intention, and entrepreneurial attitude are other imported functions perceived (Bosma et al., 2012; San-Martín et al., 2022).

Regarding gender-related aspects, various studies have shown that a solution to the male predominance in entrepreneurship can be achieved by including more female entrepreneurial role models (Abbasiachavari & Moritz, 2021). Several scholars argue that women have fewer entrepreneurial role models and less social support than their male counterparts (Noguera et al., 2013; Santos-Jaén et al., 2022). Therefore, these studies suggest the inclusion of female entrepreneurial role models during entrepreneurial training to reduce the negative effects of gender stereotypes (Enríquez & Iglesias, 2018). Indeed, Kickul et al. (2008) suggest that the inclusion of entrepreneurial role models (e.g., as guest speakers) in training environments can stimulate women's entrepreneurial behavior, mitigating work-family balance doubts and administrative barriers (Enríquez & Iglesias, 2018). According to Bosma et al. (2012), the effect can be amplified during learning activities when similarities, such as nationality and gender, occur between role models and

observers. In addition, the decision to start one's own business is also related to the similarities between the entrepreneurial role models and the individual in terms of some characteristics such as gender, age, nationality, and field of expertise (Byrne et al., 2019). However, the effect of role models with similar characteristics, such as gender and age, has been studied mainly within family and peer contexts but not in educational settings (Abbasiachavari & Moritz, 2021).

Entrepreneurial role models are still under study in the entrepreneurship literature (Abbasiachavari & Moritz, 2021), and current literature analyzing entrepreneurial role models focused primarily on different types of role models (*whom*), at which stage of life (*when*) and in which context the exposure to role models occurs (*where*). Few studies have investigated whether similarity (gender, race, and nationality) between individuals and their role models affect entrepreneurial behavior (Byrne et al., 2019).

## 2.2. Impact of gender match role models on entrepreneurial outcomes

In this study we consider entrepreneurial outcome as the impact of EE on EI, EL, and ESE. We rely upon the SCCT to examine students' aspirations in an entrepreneurial career. Given its acknowledgment of the intricacies of social realities and the impact of context on individuals' career aspirations, SCCT emerges as an appropriate theoretical framework for this study.

EI can be defined as the commitment to start a new activity (Krueger, 1993), and in general, it is considered the antecedent of entrepreneurial behavior. Several studies have demonstrated that exposure to role models affects EI and behavior and the gap between intentions and actions can be explained by individual characteristics. (e.g., Pirhadi et al., 2021; Shirokova et al., 2016; Yi & Duval-Couetil, 2018).

In line with the SCCT framework developed by (Liguori et al., 2018), we hypothesize that a gender match between students and entrepreneurial role models significantly influences EI. This theoretical framework suggests that observing similar others succeed in entrepreneurship (vicarious experiences) strengthens the likelihood of forming strong EI (Liguori et al., 2018). According to SCCT, outcome expectations - which encompass individuals' beliefs about the consequences of pursuing a certain career path - are shaped by both personal inputs, like gender, and environmental inputs, such as the presence of role models (Lent, Brown, & Hackett, 2000). The entrepreneurial role models profoundly influence students' EI (Abbasiachavari & Moritz, 2021). Several studies show how introducing entrepreneurial role models into entrepreneurship courses, including through success stories, can increase students' EI (e.g., Overwien et al., 2024). However, studies on the effects of entrepreneurship courses on students' EI show contradictory results (e.g., Mustafa et al., 2023; Yousaf et al., 2022). These studies show that exposure to entrepreneurship courses is not enough, but it is necessary to consider other determinants such as access to entrepreneurial role models (Overwien et al., 2024; Adebisuyi et al., 2022) as well as demographic characteristics, gender, and field of study (Shirokova et al., 2016; van Ewijk & Belghiti-Mahut, 2019).

Overwien et al. (2024) show that the effects of entrepreneurial role models on EI differ depending on whether entrepreneurial role models are present in the family or educational context. Much of the research on entrepreneurial role models has been approached using the family context as a control volume (Abbasiachavari & Moritz, 2021) despite the importance of incorporating entrepreneurial role models within entrepreneurship courses (San-Martín et al., 2021).

Studies have demonstrated that gender matched role models can be particularly impactful. For instance, female students often show increased EI when exposed to successful female entrepreneurs, as evidenced by research highlighting the gender-specific influence of entrepreneurial role models on EI (Karimi et al., 2014). This phenomenon highlights the importance of diversity in role models, suggesting that students may identify more closely and be more inspired by role models who share similar gender identities (Byrne et al., 2019). Indeed, research has emphasized how entrepreneurial role models should share similarities, such as gender and age, with potential entrepreneurs so as to facilitate the process of identification with them (Bosma et al., 2012). For this reason, female entrepreneurial role models are especially important for an underrepresented group such as female entrepreneurs (Elliott et al., 2020). This gender matching helps in diminishing the psychological barriers and stereotype threats that often discourage women from pursuing entrepreneurial activities, thereby fostering a more inclusive environment for developing EI (Byrne et al., 2019). Furthermore, aligning the gender of entrepreneurial role models with that of students can shift cultural norms and social expectations (Abbasiachavari & Moritz, 2021), challenging traditional roles and expanding the perceived opportunities for all genders. This alignment not only changes societal views but also directly enhances students' EI, by presenting entrepreneurship as an accessible and achievable career path regardless of gender (Karimi et al., 2014).

This gender-specific influence of entrepreneurial role models on EI underscores the need for a broader representation of both male and female entrepreneurial role models in educational settings to meet the diverse aspirations of students. Unlike these works, we are interested in the effect of gender match between students and entrepreneurial role models; thus, we formulate the following hypothesis.

**Hypothesis 1.** Entrepreneurial Intention will increase when there is a gender match between students and entrepreneurial role models. While there is no impact when there is no gender match between the student and entrepreneurial role models.

EL is an essential dynamic process in entrepreneurship, making EL and behavior closely related (Rae & Carswell, 2000). The theory of EL was first explored from the economics perspective, and it holds that EL refers to creative learning that produces innovation and improves opportunity alertness (Hahn et al., 2017). The division of EL into cognitive and experiential dimensions is further elucidated by Politis (2005), who defines EL as the process wherein entrepreneurs transform direct experiences into knowledge.

EE significantly influences EL outcomes in students (Hahn et al., 2017). EE offers codified elements, such as hard facts about business creation, and tacit knowledge, like practical entrepreneurial skills (Kim & Park, 2023). Various methods and disciplines used in EE, such as seminars, workshops, and testimonials, can increase students' EL (Hahn et al., 2017). Indeed, in the university environment, sharing between students and multiple entrepreneurial guest speakers impacts the decision-making processes associated with

entrepreneurship (Rippa et al., 2020). This led to a call to understand more about how the EL of individuals is affected by the observation of entrepreneurial role models (Zozimo et al., 2017).

The literature on the impact of entrepreneurial role model on EL is growing (Abbasianchavari & Moritz, 2021); however, few studies on EL have applied a gender perspective in their theoretical frameworks, conceptualized as gender-neutral with little attention paid to gendered dynamics (Kubberød et al., 2021). Through exposure to female entrepreneurial role models in the pre-startup phase, women can increase their EL, tackle the tension of being outsiders and excluded, and develop different strategies to face it (Kubberød et al., 2021; Stead, 2017). The gender match between entrepreneurial role models and students has a significant impact on EL, particularly among female students. Achtzehn et al. (2023) highlight that female students who interact with female entrepreneurial role models show greater assimilation of entrepreneurial skills due to the perception of a more accessible and identifiable entrepreneurial career path. In addition, interaction with entrepreneurial role models of the same gender can enhance confidence in one's entrepreneurial abilities, a key aspect of developing EL, as suggested by Stoker et al. (2024). This gender alignment promotes greater personal resonance with shared examples and experiences, facilitating deeper and more contextualized learning (Abbasianchavari & Moritz, 2021).

Grounded in SCCT, we hypothesize that EL is enhanced when students and entrepreneurial role models share the same gender, reflecting an amplification of outcome expectations and self-efficacy through gender-specific vicarious learning experiences (Adebusuyi et al., 2022; Liguori et al., 2018). Therefore, we formulate the following hypothesis.

**Hypothesis 2.** Entrepreneurial Learning will increase when there is a gender match between students and entrepreneurial role models. While there is no impact when there is no gender match between the student and entrepreneurial role models.

One factor that seems to be particularly relevant in promoting, inspiring, and supporting women's participation in entrepreneurship is self-efficacy. Self-efficacy refers to an individual's confidence, or belief, in their ability to complete a specific set of tasks (Bandura, 1977). If one person has high self-efficacy, they are more likely to pursue and persist in a task than another with low self-efficacy (Bandura, 1977; Chen et al. 1998).

Specifically, in the entrepreneurial domain, entrepreneurship scholars have developed the construct of ESE. ESE refers to an individual's belief that he or she can successfully perform an entrepreneur's roles and tasks (Boyd & Vozikis, 1994). Understanding how ESE develops is important because various pieces of research show that individuals who perceive that they possess relevant entrepreneurial skills tend to have greater intentions to engage in business creation activities (e.g., Mozahem, 2021).

To move individuals toward concrete actions and increase ESE, they must have "mastery experiences" (Dempsey & Jennings, 2014). Training and experiential education are critical for students because they can learn and practice the skills of venturing into the business world (Hahn et al., 2017).

Emerging research in EE suggests a nuanced interaction between the gender of entrepreneurial role models and the ESE of students (Mozahem, 2021). This relationship is particularly intriguing when considering the potential 'gender match' between students and their role models. The gender match between students and entrepreneurial role models can significantly influence ESE, as role models of the same gender can make entrepreneurial success more tangible and identifiable to students, enhancing their belief that they can achieve similar results (Mozahem, 2021).

This is especially important for women, as evidence suggests that women have lower levels of self-efficacy and EI than men (Elliott et al., 2020). Dempsey and Jennings (2014) find that female entrepreneurial role models can increase women's ESE. Wilson et al. (2009) showed that training and education programs influence ESE, and the positive effects of EE on ESE are stronger for women than for men. Therefore, they propose the implementation of "gender-sensitive" entrepreneurship curricula and underscore the significance of self-efficacy training to address the identified self-efficacy bias exhibited by female students. However, results on the impact of entrepreneurial role models on the ESE of male and female students only sometimes have concordant results (Mozahem, 2021). For instance, Laviolette et al. (2012) found that exposure to role models favorably impacts ESE and when students identify with these entrepreneurial role model, indicating a potential influence of role model gender on student outcomes.

Moreover, Hassan et al. (2020) observed that gender moderates the relationship between self-efficacy, opportunity recognition, and EI in students, further highlighting the potential variability of ESE across gender lines. These findings suggest that the gender of entrepreneurial role models might play a significant role in shaping the ESE of students. Therefore, a deeper exploration is warranted to understand whether and how the gender of entrepreneurial role models affects the ESE of students differently, depending on whether there is a gender match between the students and the entrepreneurial role models (Abbasianchavari & Moritz, 2021). To this end, Elliott et al. (2020) evaluated the impact of EE on the ESE and EI of female engineering and computer science students at a Canadian university by showing how an innovative gender-sensitive education and mentoring program and role models were critical in increasing the confidence of potential future female entrepreneurs. Indeed, when female students identify with mentors of their same gender, they perceive entrepreneurship as a more attractive career path significantly, strengthening their ESE (Elliott et al., 2020). These findings suggest that educational interventions that promote gender alignment in role models may not only increase ESE in female students, but also shift cultural norms and social expectations that traditionally limit female entrepreneurial choices (Mozahem, 2021).

Under the SCCT framework, a gender match between students and entrepreneurial role models is posited to directly influence ESE by providing relatable vicarious experiences and enhancing the perceived likelihood of successful entrepreneurial outcomes (Liguori et al., 2018). This theory argues that ESE is developed through mastery experiences, vicarious learning, and social persuasion, all of which can be significantly impacted by the presence of gender-matched role models (Adebusuyi et al., 2022). Hence, gender congruence between students and entrepreneurial role models can crucially enhance ESE, fostering a greater belief in one's capabilities to execute entrepreneurial roles and tasks. Different from the studies mentioned, our research focuses on the impact of gender match

between students and entrepreneurial role models; thus, we propose the following hypothesis.

**Hypothesis 3.** Entrepreneurial Self-Efficacy will increase when there is a gender match between students and entrepreneurial role models. While there is no impact when there is no gender match between the student and entrepreneurial role models.

We aim to investigate if the exposure to a prevalent male role model presents differences from the exposure to a prevalent female role model and if males and females behave differently based on the type of exposure. Thus, we hypothesize that the EI, EL, and ESE will increase when there is a gender match between students and entrepreneurial role models (see Fig. 1). While there is no impact with a no gender match between student and entrepreneurial role models.

**3. Methodology**

According to [Primario et al. \(2022\)](#), we applied a two-stage quali-quantitative analysis to assess the improvement of Engineering students’ expertise and capabilities after taking an entrepreneurship course. A pre-test/post-test experimental design allows us to assess the differences between pre-test and post-test scores about the results of an experimental manipulation designed to increase students’ entrepreneurial outcomes, namely EI, EL, and ESE.

*3.1. EE course description*

We realized a field study with students attending the last year of the Management Engineering master’s degree at the University of Naples Federico II. The “Strategy and Entrepreneurship” course constituted the basis for analyzing if a prevalent male role model presents differences from the exposure to a prevalent female role model and how students’ outcomes develop.

The data collection has been realized in two different years: 2019/20 (Class 1) and 2022/23 (Class 2). Both classes follow an entrepreneurial class program aimed at creating an experiential, professional and highly interactive learning environment. The program is organized into the following parts ([Primario, Rippa, & Secundo, 2022](#)).

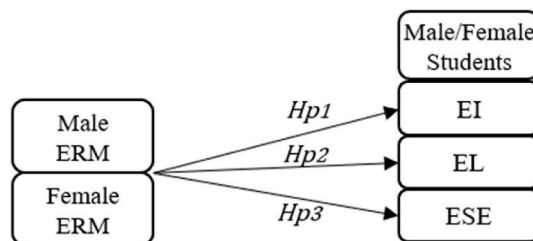
- 50% of theoretical lessons to give students the basics of the entrepreneurial mindset, emphasizing the main models adopted to create a business. The modules cover all stages of developing a business plan (market plan, organizational plan, operational plan, financial plan);
- 30% of seminars with testimonials from firms, startups, incubators, institutional and private investors, business angels, and governmental departments;
- 20% are devoted to project work activities in which students are stimulated to create their own business projects. After describing their business idea, students conduct a market analysis and present the technical details of their product/service through slides, papers, and videos. Finally, students identify a business model with the definition of cost structure, market strategy, and communication and marketing plan.

Class 1 and Class 2 differ in one main aspects: 100% of seminars in Class 1 were performed by male experts, while in Class 2 were performed only by female experts. Additionally, the two classes run in two different years. [Table 1](#) presents the main information on the structure of the courses. [Table 2](#) describes the topics covered by the entrepreneurial role models.

Therefore, the course structure follows the *competence model* proposed by [Bécharad and Grégoire \(2007\)](#), in which students play an active role, and instructions are transmitted through networking and comparison with entrepreneurial realities or through solving real entrepreneurial problems ([Johansen & Schanke, 2013](#)). In this case, students put their theoretical knowledge into practice with the help of teachers with the role of coaches and developers who teach “*through* entrepreneurship” ([Hytti & O’Gorman, 2004](#)).

*3.2. Data collection procedure*

Data were collected through ex-ante and ex-post administration of a questionnaire in both years. Indeed, student samples are commonly used to analyze the evolution of entrepreneurial outcomes since they represent a homogeneous group of people with similar ages and qualifications ([Laspita et al., 2023](#)). Furthermore, we refer only to the Italian context to reduce the influence of other contextual variables ([Sansone et al., 2021](#)). We chose the University of Federico II as our research setting due to its alignment with



**Fig. 1.** Research hypotheses framework.

**Table 1**  
Course structure.

Item	Class 1	Class 2
Academic year	2019–20 (first semester)	2022–23 (first semester)
Instructor	Professor of entrepreneurship with a business background and managerial experience in the field of startups	
Program	Five modules: Introduction to entrepreneurship Market plan Organization plan Operational plan Financial plan	
Testimonials/tutor (see next table for details)	All males	All females
Examination criteria	Written text - Group presentation	
Students descriptives	Last year managerial engineering master's degree students M = 66 F = 40 Average Age = 23.3 (SD = 1.52)	Last year managerial engineering master's degree students M = 50 F = 38 Average Age = 24.2 (SD = 1.54)
Students' grade	M = 29,05/30 F = 29,22/30	M = 28,27/30 F = 28,68/30
Course category	Mandatory	

**Table 2**  
Topics Covered by the entrepreneurial role models.

n.	Class 2 All MALE entrepreneurial role models	Class 2 All FEMALE entrepreneurial role models	Topic	Notes
1	Engineering students presenting their business idea launched in 2018	Sustainable manager of an innovative startup	Entrepreneurial opportunity	An early-stage startup promoted and managed by students
2	A market expert graduated in social media management, who founded his small consulting firm in 2018	A market expert, graduate in business, and owner of a brand in the fashion industry	Marketing plan	Marketing management
3	A manager of a private incubator	A manager of a private incubator/accelerator	Business model	Coaching
4	A business coach with exit startup experience who founded his own personal consulting firm	A consultant who founded an incubator in a peripheral area	Business model	Coaching
5	A venture capitalist with more than 20 years of experience	Manager of an Italian bank	Financing	Investment
6	An entrepreneur who founded his company in 2012, tourism sector	Young founders of a new bar in a peripheral area	Strategy planning	Small business
7	Three male entrepreneurs founded their company in 2018, food sector	A female entrepreneur who has relaunched the old family brand that had been discontinued for a long time in the food sector	Governance	Small business
8	An expert in the crowdfunding sector	An expert in the crowdfunding sector	Financing	Investment
9	An expert in 3d Printing technologies promoting initiatives in the design sector	An entrepreneur promoting a social initiative	Social impact	Social innovation
10	A researcher in industrial engineering presenting his technological spinoff	A researcher in biotechnology presenting her technological spinoff	Academic entrepreneurship	Academic spinoff
11	Two experts in CRM presenting a commercial platform for business	An entrepreneur presenting her idea of a business of collaborative mapping	Digital transformation	Digital technologies

international standards and its reflection on global STEM education and entrepreneurship challenges. It's also crucial to highlight that, despite a surge in startup activities, the area around the University of Federico II faces ongoing significant gender disparities and low female entrepreneurship rates.

Our survey focused on engineering students, considering the importance assumed by entrepreneurship in engineering majors (Rippa et al., 2023). Entrepreneurship courses within engineering programs have grown considerably in recent decades, especially in countries with knowledge-based economies such as the US and Japan (Yi & Duval-Couetil, 2018).

At the beginning of each of the two courses, students were asked to fill out a questionnaire (*pre-survey*). The same questionnaire was administered at the end of the course after the students had submitted their final project (*post-survey*). Both pre- and post-survey were distributed electronically. According to Primario et al. (2022), we used a serial number for each student, and the pre- and post-survey scores were matched to capture the possible shift of investigated constructs.

### 3.3. Measurement

The questionnaire has two sections; the first is devoted to collecting personal information and general satisfaction about the course, and the second is related to measuring students' entrepreneurial outcomes (EL, EI, and ESE). In the questionnaire, participants were also asked to indicate their gender following the definition provided by Coen and Banister (2012). All students identified themselves as either male or female, avoiding other constructs in the spectrum. The same occurred with the entrepreneurial role models when they were asked to identify their gender.

The section on EI was constructed following the guidelines provided by Ajzen (1991) for measuring TPB constructs. To measure ESE, we used the items posited by McGee et al. (2009), who developed and tested a multidimensional ESE instrument on a diverse sample that includes nascent entrepreneurs. Finally, we use the perceptual scale developed by Souitaris et al. (2007) to measure the impact on EL. Some additional questions were also included in the study but omitted in this particular analysis. In all questions, participants were asked to express their degree of agreement with a statement on a 7-point Likert scale (from "Strongly disagree" to "Strongly agree."). All questionnaire items used are reported in Table A in the appendix.

After qualitatively analyzing the distribution of the data and considering the sample sizes to check whether the samples followed a normal distribution, we performed the Shapiro-Wilk and Kolmogorov-Smirnov tests, both of which were negative; therefore, the analysis was continued using nonparametric tests such as the Wilcoxon test, on IBM SPSS Statistics v 28 (IBM SPSS Inc. Chicago, USA), to analyze whether the null hypotheses could be rejected (no difference between pre- and post-survey scores).

In Class 1, 160 students responded to the pre-survey, but by matching the ID with the respondents to the post-survey, we got 106 responses. Meanwhile, in Class 2, 107 students participated in the pre-survey, and matching the IDs of the respondents to the post-survey resulted in 88 useable responses for the study. The participation in the study was part of optional and noncredit-bearing activities.

In Class 1, 106 students participated with a mean age of 23.3 years (SD = 1.52), of whom 38% were female. In Class 2, 88 students participated with a mean age of 24.2 years (SD = 1.54), of whom 43% were female.

The data collected ex-ante and ex-post for each class were divided by respondent gender. Then, the female respondents' ex-ante and ex-post responses for Class 1 and 2 were compared. Finally, the same analysis was conducted for the responses collected from male respondents.

Fig. 2 reports all the steps of the study protocol as previously described.

### 4. Results

First, items used to measure constructs included in the questionnaires were assessed regarding internal consistency using Cronbach's alpha and composite reliability (CR) for the pre- and post-survey. Results exceed the 0.70 threshold, showing enough reliability (Table 3). The next step assesses convergent validity, i.e., the extent to which indicators of the same variable share a (high) proportion of variance. The average variance extracted (AVE) is considered to evaluate convergent validity. All AVE measures exceed 0.50,

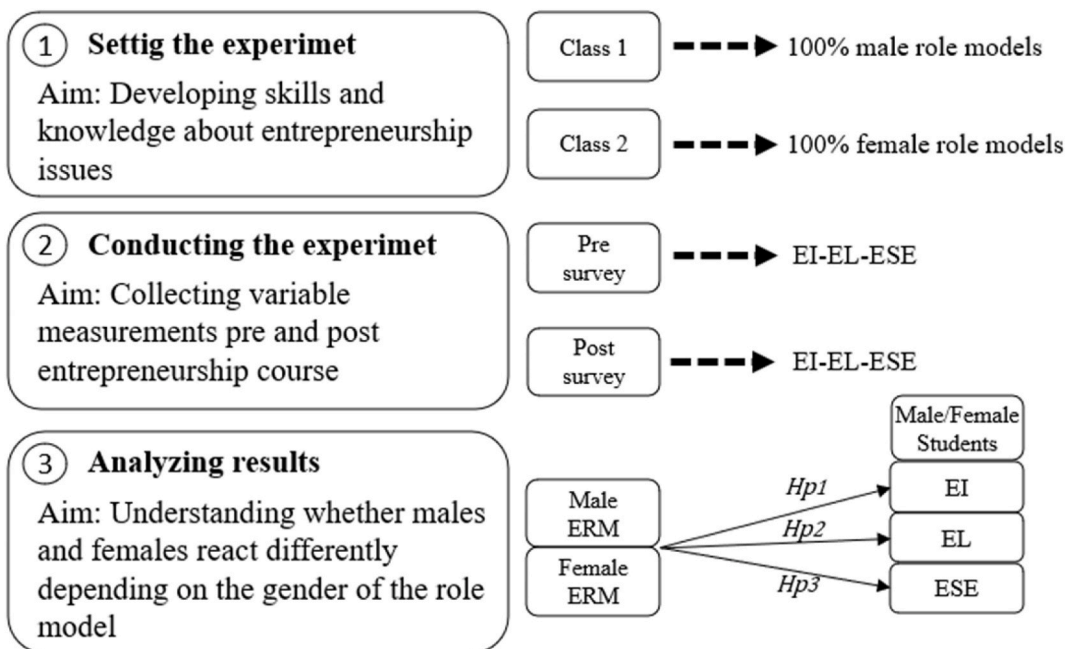


Fig. 2. The proposed procedure.

**Table 3**  
Internal consistency and convergent validity.

	Construct	Cronbach's alpha pre	Cronbach's alpha post	Composite reliability pre	Composite reliability post	AVE pre	AVE post
Class 1	EI (6 items)	0.926	0.927	0.946	0.947	0.741	0.740
	EL (5 items)	0.910	0.855	0.920	0.890	0.735	0.624
	ESE (6 items)	0.940	0.885	0.890	0.935	0.732	0.690
Class 2	EI (6 items)	0.955	0.961	0.968	0.965	0.819	0.838
	EL (5 items)	0.850	0.862	0.892	0.896	0.620	0.635
	ESE (6 items)	0.926	0.854	0.953	0.808	0.625	0.726

indicating acceptable convergent validity (Table 3). Fornell and Larcker (1981) suggest that discriminant validity is established if a latent variable accounts for more variance in its associated indicator variables than it shares with other constructs in the same model. In our case, each construct's AVE, compared with its squared correlations with other constructs in the model, satisfies the Fornell and Larcker requirements (for details, see Table B in the Appendix).

Then, Kolmogorov–Smirnov and Shapiro-Wilk tests were conducted to check the normality of the data. The test results showed that the data were not normally distributed, using an alpha value (e.g., 0.05). Therefore, the mean scale scores for the pre- and post-survey items were evaluated for the significance of difference using the nonparametric Wilcoxon signed-rank test. This nonparametric data analysis is recommended as the better choice in non-normal distributions than the Student's t-test (Primario et al., 2022). Table 4 shows the statistical results of the pre- and post-survey of Class 1 and Class 2 for each construct. In Table 5, the average values for each construct across the various questionnaires administered are reported.

In Class 1, in which the experts who participated were all male, we note an increase in the mean EI in men resulting in  $\overline{EI} \text{ Post Male} - \overline{EI} \text{ Pre Male} = 0.535$ , with a significant Wilcoxon test ( $W = 2.359; p = 0.018$ ). Therefore, accepting a risk of the first kind  $\alpha = 0.05$ , we can assume that male respondents were influenced by attending an entrepreneurship course, significantly increasing their EI. However, this result does not hold true for female respondents for whom we do not see a significant increase in EI ( $W = 0.941; p = 0.341$ ); furthermore, we also observe a reduction in the average EI of females ( $\overline{EI} \text{ Post Female} - \overline{EI} \text{ Pre Female} = -0.115$ ).

Whereas, in Class 2, where the experts who attended the lectures were all female, the difference in men's EIs pre- and post-exposure to the entrepreneurship course does not appear to be statistically significant ( $W = -0.376; p = 0.707$ ); in addition, we even notice a decrease in the average EI of men ( $\overline{EI} \text{ Post Male} - \overline{EI} \text{ Pre Male} = -0.107$ ). However, in Class 2, we note a statistically significant difference in the EI of female respondents ( $W = -2.248; p = 0.025$ ) with a significant increase in the average EI ( $\overline{EI} \text{ Post Female} - \overline{EI} \text{ Pre Female} = 0.391$ ).

While we note that there is an increase in EL for both female and male students in both classes. In addition, we observed a greater increase in EL for both male and female students after participating in Class 1.

Regarding the ESE, in Class 1 we note a statistically significant difference in the ESE of female respondents ( $W = 3.50; p = 0.001$ ) with a significant increase in the average ( $\overline{ESE} \text{ Post Female} - \overline{ESE} \text{ Pre Female} = 0.760$ ). Furthermore, we note a statistically significant difference in the ESE of male respondents ( $W = 2.244; p = 0.025$ ) with an increase in the average ESE ( $\overline{ESE} \text{ Post Male} - \overline{ESE} \text{ Pre Male} = 0.411$ ).

While in Class 2, we note a statistically significant difference in the ESE of female respondents ( $W = 2.820; p = 0.005$ ) with a significant increase ( $\overline{ESE} \text{ Post Female} - \overline{ESE} \text{ Pre Female} = 0.676$ ). However, we do not note a statistically significant difference in the ESE of male respondents ( $W = -0.906; p = 0.365$ ), with a slight increase in the average ( $\overline{ESE} \text{ Post Male} - \overline{ESE} \text{ Pre Male} = 0.173$ ).

### 5. Discussion

This research advances the discussion on fostering entrepreneurial outcomes within educational settings by underscoring the pivotal role of entrepreneurial role model and aligning with the theoretical tenets of SCCT. It emphasizes the critical need to invest in the youth to unearth new business opportunities, contributing to economic growth and innovation (Urbano et al., 2019). Universities emerge as vital enablers in this endeavor by offering EE sensitive to the sociocultural embedding of students, influencing the acquisition of entrepreneurial skills (Hahn et al., 2020).

**Table 4**  
Results of wilcoxon signed-rank test.

Entrepreneurial Role Model			Student	
			Male	Female
Class 1	Male	EI	$W = 2.359; p^* = 0.018$	$W = 0.941; p = 0.341$
		EL	$W = 6.00; p^* = 0.001$	$W = 5.361; p^* = 0.001$
		ESE	$W = 2.244; p^* = 0.025$	$W = 3.50; p^* = 0.001$
Class 2	Female	EI	$W = -0.376; p = 0.707$	$W = -2.248; p^* = 0.025$
		EL	$W = 3.860; p^* = 0.001$	$W = 4.425; p^* = 0.001$
		ESE	$W = -0.906; p = 0.365$	$W = 2.820; p^* = 0.005$

\*Test significant for  $p = 0.05$ .

**Table 5**  
Mean entrepreneurial outcomes.

	$\overline{EI}$ Male Students		$\overline{EL}$ Male Students		$\overline{ESE}$ Male Students		$\overline{EI}$ Female Students		$\overline{EL}$ Female Students		$\overline{ESE}$ Female Students	
	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey	Pre-Survey	Post-Survey
	Class 1	M = 4.159	M = 4.694	M = 4.118	M = 5.727	M = 4.378	M = 4.790	M = 4.365	M = 4.250	M = 3.435	M = 5.745	M = 3.895
Class 2	M = 4.780	M = 4.673	M = 4.836	M = 5.710	M = 4.933	M = 5.106	M = 3.657	M = 4.048	M = 4.373	M = 5.779	M = 4.110	M = 4.786

Our study corroborates findings by [Donaldson et al. \(2023\)](#) that EE enhances entrepreneurial outcomes among both genders. However, we delve deeper into the differential impact of entrepreneurial role model on students' EI, EL, and ESE from a gender perspective, an area less explored in extant literature ([Abbasiachavari & Moritz, 2021](#)).

The research confronts the entrenched gender stereotypes within entrepreneurship ([Meyer et al., 2017](#)) by demonstrating the gender-specific influences of entrepreneurial role models. Aligning with [Kickul et al. \(2008\)](#), we propose that university programs can serve as critical touchpoints for students without entrepreneurial family backgrounds, providing them with relatable role models. By integrating female role models within EE, there is a clear indication of improved EI among female students, effectively challenging the normative male-oriented view of entrepreneurship and addressing the gender gap. This intervention aligns with the assertion by [Nowinski and Haddoud \(2019\)](#) on the benefits of showing successful entrepreneurial endeavors during curricular activities.

In a compelling finding, the study reveals that exposure to female role models significantly reinforces the confidence of female students in Class 2, aligning with the SCCT's emphasis on vicarious experiences and learning through identification with role models ([Liguori et al., 2018](#)). This supports Hp1 by showing a gender matched influence on EI and challenges the traditional gender-biased narrative, suggesting a shift towards a "gender-sensitive" approach in EE.

Here, the substantial increase in male students' EI after exposure to male entrepreneurial role models, as well as the significant increase in female students' EI in Class 2, where female entrepreneurial role models were adopted, suggests a positive influence specific to gender matching. This is an interesting result if compared to previous studies where lower EI among women compared to men before and after undertaking EE was revealed ([Nowiński et al., 2019](#)). This means that exposure to female role models boosted female students' confidence and improved their intention to start entrepreneurial activities by reducing the differences between males and females. This is in line with [Byrne et al. \(2019\)](#), who point out that entrepreneurs in a business's pre- and post-startup phase tend to have role models that resemble each other regarding gender, facilitating role identification. After the testimonies of successful female entrepreneurs, the EI of female students increased and was significantly higher than the EI of male students after the testimonies of male entrepreneurs. This confirms the findings of [Lavolette et al. \(2012\)](#), who show that female role models generate a stronger impact on women's EI than male role models for male students.

Contrastingly, the increase in EL across genders and classes supports EE's universal and positive impact, leading to a rejection of Hp2. It highlights that while entrepreneurial role model gender may influence EI and ESE differently, the cognitive acquisition of entrepreneurial skills remains unaffected by the role model's gender.

Finally, the differential impact of gender matched entrepreneurial role models on ESE further underscores the importance of tailored role model exposure. Indeed, our results show that female role models managed to inspire only the same gender in terms of ESE, while male role models managed to engage students of both genders. Such findings emphasize the potential limitations in the impact of gender mismatched role models on certain outcomes. As confirmed by several studies, EE positively affects ESE, and exposure to an entrepreneurial role model affects women's ESE more than men's ([Passavanti et al., 2023](#); [BarNir et al., 2011](#)). Therefore, we partially reject the Hp3 and emphasize the need to consider the gender composition of entrepreneurial role models in educational settings, as well as the need for "gender-sensitive" entrepreneurship curricula.

Thus, female role models managed to inspire only same-gender people in terms of ESE, while male role models managed to engage students of both genders. This could be explained by the fact that women are more open to the inputs given by role models regardless of gender since they can provide them with more training and support, while men believe that they already possess specific entrepreneurial skills and, therefore, tend to be inspired only by same-gender role models.

Thus, it paves the way for a more inclusive and representative EE landscape, where the presence of both male and female role models can help break down perceived barriers and stereotypes.

## 6. Conclusion

This research makes a significant contribution by shedding light on strategies for enhancing females' inclination toward pursuing entrepreneurial careers. The study reveals that the most effective approach to inspire women to engage in high-growth emerging roles is exposing them to successful female role models with their professional and personal experiences. Furthermore, this investigation assisted in mitigating the impact of gender stereotypes on occupational roles and fostering the motivational factors that are crucial for women's involvement in entrepreneurship.

Results show an increase in the ESE of male students only when male entrepreneurs taught seminars. In contrast, female students significantly increased ESE both when male or female entrepreneurs taught seminars. As confirmed by several studies ([Passavanti](#)

et al., 2023), EE positively affects ESE and exposure to an entrepreneurial role model affects women's ESE more than men's (BarNir et al., 2011).

Exposure to female role models boosted female students' confidence and improved their intention to start entrepreneurial activities by reducing the differences between males and females. Moreover, after the testimonies of successful female entrepreneurs, the EI of female students increased and was significantly higher than the EI of male students after the testimonies of male entrepreneurs.

This led to some key theoretical ideas that help us better understand how gender affects how people become entrepreneurs.

Our research indicates that the existing SCCT needs to be adjusted, specifically when applied to EE (Liguori et al., 2018). Having gender-matched entrepreneurial role models can greatly improve EI, and this emphasizes the need to consider gender when creating theoretical models in this framework. Future models should clearly show how gender affects the connection between exposure to role models and outcomes in entrepreneurship. This aligns with calls from Adebusi et al. (2022) and underscores the importance of integrating gender considerations within SCCT to predict and foster EI and ESE across genders more accurately.

Then, the different effects of role models on men and women in entrepreneurship question existing theories that treat entrepreneurship as a gender-neutral activity. Our results show that gender plays a significant role in entrepreneurship. Therefore, theories need to acknowledge the different ways in which role models influence men and women.

Across all genders, the consistent rise in EI implies that while entrepreneurial role models might influence EI and ESE differently for men and women, acquiring entrepreneurial knowledge through EE is less affected by role model gender. This finding has theoretical implications for theories on EI, indicating that while role model gender is essential for motivation and self-belief in entrepreneurship, the cognitive side of learning may be less susceptible to gender biases. This distinction emphasizes the necessity for theories that differentiate between entrepreneurial education's motivational and cognitive aspects.

The study shows that the influence of entrepreneurial role models on ESE depends on whether the entrepreneurial role model's gender matches that of the entrepreneur. This highlights the complex nature of ESE (Liguori et al., 2018) and suggests that gender plays a nuanced role in shaping these beliefs. The finding adds to existing knowledge on ESE by showing how role model effects can vary based on gender. Researchers should consider gender as a factor when developing theoretical models of ESE to account for the specific dynamics of self-efficacy development in entrepreneurial environments. Highlighting the importance of gender congruence between students and entrepreneurial role models, the finding reinforces the SCCT framework, underscoring its pivotal role in augmenting EE's effectiveness and advocating for more inclusive and efficacious EE curricula (Adebusi et al., 2022).

Practically, this article can offer interesting suggestions for entrepreneurial educators during the program planning phase. Indeed, the presence of a unique role model can impact differently males and females. In this way, entrepreneurial educators know that adopting a single role model leads to distortions in learning mechanisms when designing the course.

Policymakers promoting entrepreneurship at every level can also use our findings to understand better the mechanisms that drive entrepreneurial outcomes and foster more effective enhancement policies.

In conclusion, this research demonstrates the importance of female role models for young female students who aspire to become entrepreneurs but are held back by negative gender stereotypes. Although the results show that women's EI, EL, and ESE increased significantly and positively after exposure to the entrepreneurship course with female experts, it is also true that there is no significant increase in men's EI and ESE in Class 2. For female students, ESE increases because of participation in an EE course regardless of the gender of the role model. Therefore, this study can help entrepreneurship educators design "gender-sensitive" university programs to encourage women's entry into entrepreneurship, while continuing to support men's entrepreneurship, such as through interaction with role models of both genders.

### 6.1. Limitation and future research direction

However, some limitations in this study can be considered opportunities for future research. In particular, there is still little research on the role played by female teachers in EE. Therefore, future studies could also explore whether female teachers can increase the likelihood of female students becoming entrepreneurs or whether this makes no difference.

Furthermore, building on Lazaroiu and Rogalska's (2023) work, future research should explore how digital tools and role model guidance synergistically shape entrepreneurial mindsets, focusing on AI's impact on personalized learning and self-efficacy.

However, one of the most important limitations of the present research is the relatively small sample size and the fact that the study was focused on engineering students from an Italian university. Thus, in order to increase the generalizability of the results, the sample size could be increased by including students of different ages, ethnicities, and different socioeconomic conditions while also analyzing the EI, EL, and ESE of men and women in different countries. On the contrary, the sample is relatively homogeneous, and the small sample size allowed for a better qualitative and quantitative analysis that captured the nuances of participants' EI, EL, and ESE. In addition, this study focused on students' EI and not on actual entrepreneurial behaviors. This model could be extended to include students' actual entrepreneurial activities to reveal the effect of EE on startups.

Thus, our findings provide a foundation for future research, especially to enhance female entrepreneurship. Educators can gain advantages from this study in designing high-quality entrepreneurship programs and courses in order to stimulate entrepreneurial activities for both males and females. These entrepreneurship programs must facilitate female entrepreneurship to change the perception that entrepreneurs are exclusively male, incentivize women to initiate business ventures, and promote the notion that female-owned businesses can achieve comparable, if not superior, levels of success to male-owned businesses. This can be done by including female role models in classroom visits in entrepreneurship programs to encourage female students and mitigate or even eliminate differences in the assessment of opportunities between men and women by changing the language associated with entrepreneurship.

**CRedit authorship contribution statement**

**Carmine Passavanti:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. **Simonetta Primario:** Writing – review & editing, Methodology, Formal analysis, Data curation. **Pierluigi Rippa:** Writing – review & editing, Writing – original draft, Validation, Supervision, Investigation, Conceptualization.

**Data availability**

The data that has been used is confidential.

**Appendix**

**Table A**  
Questionnaire Items

Construct	Question	Question ID
<b>Entrepreneurial Intention</b>	I am ready to become an entrepreneur	EI_1
	I would like to undertake a new business idea	EI_2
	I am next to undertaking a new business	EI_3
	I am strongly oriented to undertake new business in the future	EI_4
	Despite conflicting opinions, I would still like to become an entrepreneur	EI_5
	I strongly intend to found a business in the future	EI_6
<b>Entrepreneurial Learning</b>	Deepened my insights into the attitudes, values, and motivations of entrepreneurs	EL_1
	Expanded my knowledge of the steps required to initiate a business	EL_2
	Improved my management capabilities for starting a business	EL_3
	Strengthened my networking skills	EL_4
	Enhanced my skill in identifying business opportunities	EL_5
<b>Entrepreneurial Self-Efficacy</b>	To grasp market demand for a new product or service	ESE_1
	Developing a new product or service to meet customers' needs	ESE_2
	Managing the innovation process	ESE_3
	Commercialize a new business idea	ESE_4
	Setting up new relations and sharing information	ESE_5
	Developing an effective communication strategy for promoting new products or services	ESE_6

**Table B**  
Discriminant Validity

		PRE			POST		
		EI	EL	ESE	EI	EL	ESE
Class 1	<b>EI</b>	1			1		
	<b>EL</b>	0.074	1		0.054	1	
	<b>ESE</b>	0.199	0.294	1	0.208	0.165	1
Class 2	<b>EI</b>	1			1		
	<b>EL</b>	0.099	1		0.073	1	
	<b>ESE</b>	0.203	0.144	1	0.256	0.166	1

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