



# Risk-taking, knowledge, and mindset: unpacking the antecedents of entrepreneurial intention

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## Abstract

This paper expands the existing literature on entrepreneurial intentions by employing the integrated model of external factors, personality characteristics, the theory of planned behavior, and social cognitive theory to explore the effects of risk-taking, entrepreneurial knowledge, entrepreneurial mindset, and cognitive antecedents on entrepreneurial intention. Adopting a cross-sectional approach, this study collected data from 422 respondents using questionnaires, and the findings were analyzed using partial least squares-structural equation modeling. The results suggest that risk-taking is closely related to opportunities and shapes entrepreneurial self-efficacy; entrepreneurial knowledge is crucial in developing entrepreneurial intention by shaping cognitive antecedents. The effect mechanism of the entrepreneurial mindset can change the coping defense mechanism by boosting attitude and self-confidence. Attitude towards entrepreneurship is one of the best factors in driving entrepreneurial intention and will subsequently directly affect behavior. Unleashing entrepreneurial competencies is vital for enhancing entrepreneurial intention. Furthermore, entrepreneurial passion can act as a moderator among attitudes toward entrepreneurship, entrepreneurial self-efficacy, and entrepreneurial intention. The findings also provide seminal insights into external factors, cognitive antecedents, and entrepreneurial intentions for policymakers to design education programs.

**Keywords** Entrepreneurial knowledge · Entrepreneurial mindset · Risk-taking · Attitude towards entrepreneurship · Entrepreneurial intention

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## Introduction

In developing countries, entrepreneurship and starting up new ventures have been recognized as significant contributors to economic growth, playing an essential role in innovation, agility, and job creation (Caputo et al., 2016; Gupta et al., 2020). By introducing new products, services, and technologies, entrepreneurship catalyzes economic advancements and solidifies the importance in national economic trajectories. In this scenario, academic studies emphasize the role of entrepreneurial education in developing the required mindset, knowledge and skills for entrepreneurship (Palalić et al., 2017; Patrício & Ferreira, 2023; Ramadani et al., 2022).

Historically, the Theory of Planned Behavior (TPB) has been instrumental for researchers in entrepreneurship, offering insights into the cognitive factors shaping entrepreneurial decisions actions, and intentions (Halbusi et al., 2023; Krueger & Carsrud, 1993; Mehtap et al., 2017). Within this framework, entrepreneurial intention stands out as a primary variable, influenced by attitudes towards entrepreneurship, prevailing social norms, and entrepreneurial self-efficacy (Kryeziu et al., 2024). While previous studies such as Farani et al. (2017) delved deeply into the role of entrepreneurial knowledge, their perspective primarily relied on a singular theoretical approach, not fully addressing the interconnected dynamics of TPB's three dimensions. Based on the above empirical shreds of evidence, an integrated model of the effect of personal traits, environmental and motivational variables on cognitive antecedents in driving entrepreneurial behavior should be considered to provide a comprehensive overview of the literature on entrepreneurial intention.

Previous research has extensively examined the link between personality traits and entrepreneurial intention (Kryeziu et al., 2024; Sun et al., 2020; Alshebami & Seraj, 2022). However, relatively few studies have evaluated the influence of personal traits through the three dimensions of the Theory of Planned Behavior (TPB) or through each cognitive antecedent individually (Ahmed et al., 2020). This study aims to fill that gap by focusing on three critical antecedents shaping entrepreneurial intention: risk-taking, entrepreneurial knowledge, and entrepreneurial mindset.

Risk-taking has long been considered a key trait of entrepreneurs, yet the specific ways in which different types of risk-taking shape entrepreneurial behavior remain underexplored. The current study builds on the work of Munir et al. (2019), who investigated how risk-taking influences cognitive antecedents. This research extends their work by addressing a critical question: *is greater risk-taking associated with higher chances of entrepreneurial success?* Understanding how varying levels and types of risk-taking impact intention, behavior, and decision-making processes is crucial to answering this. Previous studies (Miralles et al., 2015; Memon et al., 2019) highlight that risk-taking tendencies are often influenced by entrepreneurial knowledge, suggesting that education and training may enhance an individual's ability to take calculated risks.

Entrepreneurial knowledge, whether acquired through formal courses or informal experiences, plays a significant role in shaping entrepreneurial intentions. As Miralles et al. (2015) and Memon et al. (2019) point out, such knowledge equips individuals with the skills and confidence necessary to navigate the entrepreneurial process. Liao et al. (2022a) further found that entrepreneurial knowledge enhances

awareness and self-confidence, helping individuals to overcome challenges. Despite these findings, the distinction between formal and informal knowledge in influencing entrepreneurial intention remains inadequately explored. This study seeks to address this gap by providing an in-depth examination of how both types of knowledge contribute to shaping cognitive antecedents such as attitude, subjective norms, and perceived behavioral control, which are central to entrepreneurial intention.

The third critical antecedent, the entrepreneurial mindset, has received growing attention in recent years. Liao et al. (2022b) demonstrated that an entrepreneurial mindset is positively related to entrepreneurial intention, both directly and indirectly through its effects on attitudes, social norms, and entrepreneurial self-efficacy. However, the mechanisms through which an entrepreneurial mindset shapes these cognitive antecedents have not been fully examined. This study extends Liao et al.'s findings by offering a more coherent and detailed analysis of how an entrepreneurial mindset influences each antecedent and subsequently drives entrepreneurial behavior.

In parallel, some researchers have explored the relationship between entrepreneurial mindset and entrepreneurial competencies. Most studies, however, have focused on emotional competencies, leaving other important facets underexplored (Fernández-Pérez et al., 2019; Velástegui & Chacón, 2021). Drawing on the arguments of Homer and Lim (2023), this study posits that a comprehensive set of entrepreneurial competencies—rather than isolated skills—better predicts entrepreneurial success. Specifically, this research argues that a well-rounded entrepreneurial mindset, coupled with high levels of entrepreneurial competencies, improves the ability to recognize opportunities and translate intention into action. Furthermore, Karimi (2019) called for a deeper exploration of the moderating role of entrepreneurial passion. By investigating how passion interacts with the cognitive antecedents of risk-taking, entrepreneurial knowledge, and mindset, this research provides new insights into how entrepreneurial intentions are shaped and translated into action, particularly in a postgraduate context.

Lastly, this study investigates the context of Taiwan, where the Chinese culture plays a pivotal role in shaping commerce, largely due to the significant presence of ethnic Chinese in global business, especially in Asian nations (Dana, 2014). Taiwan has emerged as a notable hub for startups where small and medium-sized enterprises (SMEs) are distinguished by their adaptability and resilience, with many achieving the status of “hidden champions” in the global supply chain, such as Taiwan Semiconductor Manufacturing Company (TSMC), Asus, and Nvidia. The achievements of these startups can be attributed to three key factors: physical infrastructure, supportive government policies, and robust commercial and professional infrastructure services. In the annual report from the Global Entrepreneurship Monitor (GEM, 2023), Taiwan ranked third among 51 nations in terms of entrepreneurial activity, surpassed only by the United Arab Emirates and Saudi Arabia. The World Bank has recognized Taiwan as one of the “East Asian miracles”, highlighting its impressive economic development. However, in the rapidly evolving landscape of the digital era 4.0, Taiwanese entrepreneurs encounter a myriad of challenges that must be addressed to sustain their growth and innovation. This research aims to provide a comprehensive analysis of how to stimulate entrepreneurial intentions and behavior in the Taiwanese context.

This study aims to contribute to the literature on entrepreneurial intention in three ways: (1) to explore how factors such as risk-taking and entrepreneurial knowledge influence entrepreneurial intention, addressing the need to further investigate the impact of entrepreneurial education on actual intentions and actions as proposed by Kryeziu et al. (2024); (2) to elucidate the mechanisms through which an entrepreneurial mindset impacts on cognitive antecedents in shaping entrepreneurial intention; (3) to investigate how an entrepreneurial mindset intersects with competencies and intentions, considering the potential moderating effects of entrepreneurial passion. In this line, we target the call by Halbusi et al. (2023) to incorporate entrepreneurial competencies rather than only focusing on intentions.

## Theoretical background

### Theory of planned behavior

The theory of planned behavior (TPB) claims that attitudes toward the behavior, subjective norms, and perceived behavioral control may accurately anticipate intentions to undertake various types of behaviors (Ajzen, 1991). TPB assumes that when individuals confront a plethora of issues vs. alternative options, they may choose to react or not react based on a prior evaluation of the behavior. The second is perceived feasibility, an individual's self-assessed capacity to launch an entrepreneurial enterprise, commonly measured in terms of self-efficacy but originally stated as perceived behavioral control in early versions of TPB (Ajzen, 1991). The third component is social norms, which pertain to the perceived level of normative societal pressure and attitudes about partaking in such activity (Ajzen, 2005; Ajzen & Cote, 2008; Krueger et al., 2000). This conceptual ordering predicts entrepreneurial activity based on the influence of these variables on intentions, which may be gained from individual antecedent factors such as demographic features or personality qualities, as well as merely environmental conditions. In summary, the TPB is used in this study to explain the impact of risk-taking, entrepreneurial knowledge, and entrepreneurial mindset on entrepreneurial intention through the lens of cognitive antecedents.

### Social cognitive theory

Social cognitive theory (SCT) is one of the most widely used theories of health behavior (Baranowski et al., 2002). SCT proposes a reciprocal deterministic relationship between the individual, his or her environment, and behavior; all three elements interact dynamically and reciprocally to form the foundation for behavior, as well as potential interventions to change it (Bandura, 1986, 2001). According to Bandura (1989, 2006), learning, motivation, and behavioral processes are the result of a reciprocal and bidirectional interaction between environmental inputs, personality traits, and behavioral outcomes. Furthermore, if an individual has strong feelings/emotions (i.e., passion), they may decide for an entrepreneurial career based on their traits that would lead to a desired conclusion (Nwosu et al., 2022; Kyriakopoulos et al., 2024). We adopt SCT to explain how personal and motivational elements (risk-taking, entre-

preneurial mindset, entrepreneurial knowledge) are related to behavioral outcomes (entrepreneurial intention) via the lens of cognitive antecedents complementing existing research that combines SCT with the entrepreneurial intentions model to deepen the understanding of intentions going beyond fixed characteristics and also considering developable competencies (Palmer et al., 2021).

## Entrepreneurial intention model

The entrepreneurial event theory (Shapero & Sokol, 1982) defines the creation of a company as the result of the interplay of contextual circumstances, which would function through their effect on the individual's perceptions. Ajzen (2001) identifies three cognitive elements that drive behavior, as follows: (1) perceived behavioral elements would be defined as the perception of the easiness or difficulty in the fulfillment of the behavior of interest, similar to perceived self-efficacy (Bandura, 1997), and to Shapero and Sokol's (1982) vision about perceived feasibility; (2) attitude towards behavior relates to the degree to which the individual feels a positive or negative personal appraisal about becoming an entrepreneur; (3) perceived social norms measure the perceived societal pressure to carry out—or not carry out—the entrepreneurial behavior.

## Hypothesis Development

### Risk-taking and cognitive antecedents

Entrepreneurs, it is believed, must be willing to accept risks as launching a new business means making and taking decisions under uncertainty (Gürol & Atsan, 2006). As defined by Hisrich et al. (2005), entrepreneurial risk-taking entails “assuming the financial, mental, and social risk” that comes with the entrepreneurial process. Previous studies have discovered a favorable association between risk-taking and entrepreneurship (Ahmed et al., 2020; Nowiński et al., 2020). Drawing on this information and the TPB, we formulate the following hypothesis.

*H1a: Risk-taking is positively related to attitude towards entrepreneurship.*

The propensity for risk-taking is traditionally viewed as a personality trait generally associated with entrepreneurs. Earlier research considered risk-taking as the antecedent to TPB dimensions stressing its role in enhancing entrepreneurial intentions (Scafarto et al., 2019). Social norms, meaning ‘the perceived social pressure to perform or not to perform the behavior’ (Ajzen, 1991, p. 188) are also positively related to entrepreneurial intentions. Considering that a risk-taking behavior is a common trait of entrepreneurial path (Begley & Boyd, 1987; Knight, 1921; Mill, 1848), we propose the following:

*H1b: Risk-taking is positively related to social norms.*

The interplay between self-efficacy and risk-taking propensities among entrepreneurs has garnered significant attention, although research provides mixed results. On the one hand, scholars posit that any discernible risk aversion among entrepreneurs can be attributed to their notably pronounced self-efficacy (Densberger, 2014). On the other hand, empirical evidence suggests that entrepreneurs with an elevated sense of self-efficacy exhibit a heightened inclination to embrace risks, as discussed by Memon et al. (2019) who identified a robust positive correlation between risk propensity and entrepreneurial self-efficacy. Based on these insights, we propose the following hypothesis:

*H1c: Risk-taking is positively related to entrepreneurial self-efficacy.*

### **Entrepreneurial knowledge and cognitive antecedents**

Entrepreneurial knowledge is a construct that represents the entrepreneurial experience learned from others (vicarious experience) (Holcomb et al., 2009). It plays a part in developing a person's cognitive abilities and improving one's efficacy in entrepreneurship (Boyd & Vozikis, 1994; Zhao et al., 2005). Entrepreneurial knowledge plays a crucial role in enhancing entrepreneurial activity as discussed by Miralles et al. (2015), who discovered that those who have gained entrepreneurial knowledge through job experience and/or education would also have a higher entrepreneurial attitude. This result is also confirmed in the study proposed by Tomy and Pardede (2020) who discussed the importance of higher education in fostering entrepreneurial awareness and entrepreneurship selection. Therefore, we propose the following hypothesis:

*H2a: Entrepreneurial knowledge is positively related to attitude towards entrepreneurship.*

In the intricate landscape of entrepreneurial behavior, the role of knowledge emerges as a cornerstone. Liñán et al. (2013) postulate that entrepreneurs armed with more comprehensive knowledge could gain a sharper and more accurate perception of the entrepreneurial vocation. Such clarity not only enhances the allure of the entrepreneurial pathway but could also boost social approval from influential stakeholders, given the supportive ecosystems. Individuals fortified with in-depth knowledge, especially from academic environments or specialized entrepreneurship programs, often exhibit unwavering intentions and clarity of vision. This resolute mindset can resonate with their immediate social circles, such as friends and family, thereby potentially alleviating entrenched biases against budding enterprises. Such a dynamic could serve to nurture entrepreneurial spirit and diminish societal pressures. In line with this vision, Gilaninia and Alipour (2013) affirmed a notable link between entrepreneurial knowledge and prevailing social norms. Building upon the arguments, we propose the subsequent hypothesis:

*H2b: Entrepreneurial knowledge is positively related to social norms.*

Previous research has indicated that knowledge significantly affects entrepreneurial self-efficacy (Andriani et al., 2018; Zarefard and Beri 2018); and Ripollés and Blesa (2023) state that the acquisition of entrepreneurial knowledge through entrepreneurship education will assist and promote students' aspirations to launch their own businesses. In this study, authors argue that people who are equipped with specialized knowledge from universities or those who learned from work experience tend to be more confident in the process of establishing a company. Therefore, we propose the following hypothesis:

*H2c: Entrepreneurial knowledge is positively related to entrepreneurial self-efficacy.*

### **Entrepreneurial mindset and cognitive antecedents**

An entrepreneurial mindset is defined as “a cognitive perspective that enables an individual to create value by recognizing and acting on opportunities, making decisions with limited information, and remaining adaptable and resilient in conditions that are often uncertain and complex” (Daspit et al., 2021, p.17). Having a good entrepreneurial mindset means equipping entrepreneurs with the necessary knowledge. This could be learned via their own company experience or gained through a shift in thinking in areas such as law, accounting, and management, among others. This knowledge will increase attitude toward entrepreneurship, which then leads them to choose appropriate business strategies. Hence, we suggest the following hypothesis:

*H3a: Entrepreneurial mindset is positively related to attitude towards entrepreneurship.*

The entrepreneurial mindset generally refers to a state of mind that directs human behavior toward entrepreneurial activities and outcomes. It is often considered a way of thinking grounded in a cognitive perspective (Naumann, 2017). Moreover, entrepreneurial mindset is flexible and can evolve over time through an individual's interactions with their environment (Mathisen & Arnulf, 2013). Previous research conceptualizes entrepreneurial mindset as making use of different factors, including networking and resource leveraging (Cui & Bell, 2022). Networking, from a social capital perspective, is defined as the structure of an individual's contact networks that connect various people with whom they have ties (Raider and Burt, 1996). It is based on social interaction skills and involves creating and maintaining contacts with people outside one's immediate circle. Given that entrepreneurship is a socio-economic activity, networking becomes a crucial strategy for recognizing and utilizing entrepreneurial opportunities. Resource leveraging is defined as the ability to access and exploit resources that one does not own or control to achieve one's goals (Morris et al., 2013). Resources are essential assets in transforming a novel idea into action. Considering that social support is also based on networking and resource leveraging, we propose the following:

*H3b: Entrepreneurial mindset is positively related to social norms.*

The relationship between entrepreneurial mindset and self-efficacy has been recently investigated. For example, Jiatong et al. (2021) conducted research on the entrepre-

neurial mindsets of 365 university students, revealing a significant positive correlation between an entrepreneurial mindset and self-efficacy. The researchers advocate that fostering an entrepreneurial mindset among educators, steered by university leadership, can bolster their confidence in pursuing advanced education, ultimately leading to augmented outcomes. Subsequent research by Liao et al. (2022b) elucidates that self-employed entrepreneurs exhibit a higher propensity for success when they demonstrate the capacity to critically assess a situation, evaluate pivotal contemporaneous data, and make an informed decision to advance. Delving into self-efficacy emerges as a strategic avenue for entrepreneurs, facilitating a deeper grasp of their drives, proficiencies, and boundaries. Thus, we pose the following hypothesis:

*H3c: Entrepreneurial mindset is positively related to entrepreneurial self-efficacy.*

### **Social norms and attitude towards entrepreneurship**

Social norms particularly apply to the notion that “reference individuals” would either disapprove or approve of the intention to become an entrepreneur (Ajzen, 2001). The higher the perceived importance of entrepreneurship as a career path, the more likely entrepreneurs are to perceive positive social norms in their surrounding context. Previous studies indicated that social norms strongly influence attitude towards entrepreneurship (Aloulou, 2016). Based on empirical evidence, the following hypothesis is developed:

*H4a: Social norms are positively related to attitude towards entrepreneurship.*

### **Social norms and entrepreneurial self-efficacy**

In the domain of entrepreneurship, observed disparities in entrepreneurial activities across different societies suggest underlying social determinants. Stemming from this observation, our research postulates that social norms operate both as a metric and a cognitive reservoir, which influence the self-assurance of prospective entrepreneurs. Recent scholarship, including findings by Pérez-Pérez et al. (2021), underscores the profound impact of social norms on self-efficacy. Therefore, we forward the subsequent hypothesis:

*H4b: Social norms are positively related to entrepreneurial self-efficacy.*

### **Cognitive antecedents and entrepreneurial intention**

Ajzen (1991) articulates that attitudes are reflective of an individual’s beliefs concerning specific objects or behaviors. Further delineating this idea, it is suggested that beliefs regarding any entity or behavior arise from certain characteristics associated with that entity or behavior. Consequently, individuals cultivate attitudes towards specific behaviors anchored in deeply held convictions. Engle et al. (2010) propose that entrepreneurial attitude has the highest effect on entrepreneurial intention among the three dimensions of TPB. In line with this finding, Anjum et al. (2022), have



evidenced a positive correlation between attitudes and entrepreneurial intentions. Notably, this relationship often emerges as a predominant influencer in individuals' aspirations to inaugurate new ventures.

A compelling affirmation of this connection is the study by Phong et al. (2020), which identifies the attitude toward entrepreneurship as a paramount predictor of entrepreneurial intention. The research explains that a predominant faction of students are keen on entrepreneurial pursuits, largely driven by their veneration for entrepreneurs who hold consequential societal roles. Hence, we put forth the following hypothesis:

*H5: Attitude towards entrepreneurship has a positive effect on entrepreneurial intention.*

According to Ephrem et al. (2019), psychological capital is influenced by social norms and accounts for a major amount of the variation in entrepreneurial intention. They propose that taking purposeful measures to emphasize the entrepreneurial success of prior start-ups throughout social media stories will favor entrepreneurs' self-confidence, thereby increasing their capacity to start up. Previous studies have found a significant link between social norms and entrepreneurial intent (Abbas et al., 2020). However, other research found a lower significant or not significant effect of social norms on entrepreneurial intent when compared with other dimensions of TPB (e.g., personal attitude, self-efficacy, Gorgievski et al., 2017; Phong et al., 2020; Rana et al., 2021). Hence, we posit the following hypothesis:

*H6: Social norms have a positive effect on entrepreneurial intention.*

Self-efficacy as an individual develops in his or her abilities is one of the most important factors in an individual's decision to perform or not perform an activity (for example, starting a new business or becoming an entrepreneur instructor, Nikou et al., 2023). Such a perspective is echoed in multiple studies that recognize self-efficacy as a pivotal factor shaping students' inclination towards entrepreneurship (Pfeifer et al., 2016; Sukavejworakit et al., 2018;) In light of the empirical findings, we present the subsequent hypothesis:

*H7: Entrepreneurial self-efficacy has a positive effect on entrepreneurial intention.*

### **Entrepreneurial mindset and entrepreneurial intention**

Entrepreneurial mindset is a person's commitment to entrepreneurial activities (Kuratko et al., 2020). Previous research has found that entrepreneurial mindset plays a crucial role in the development of entrepreneurial intents (Cui et al., 2019; Liao et al., 2022a, b). Entrepreneurship education and activities in colleges foster entrepreneurial mindset, which motivates students to pursue careers as entrepreneurs (Jiatong et al., 2021). Thus, we propose the following hypothesis:

*H8a: Entrepreneurial mindset has a positive effect on entrepreneurial intention.*

## Entrepreneurial mindset and entrepreneurial competencies

Entrepreneurial competencies are presented as competency, or the aspects of a person such as their knowledge and skills that enable them to be competent (Mitchelmore & Rowley, 2010). Ability to recognize and seize opportunities, the capacity to create a business vision and engage others, and the capacity to coordinate resources for the exploration of business opportunities, are also all signs of entrepreneurial competencies (Secundo et al., 2020). Considering that we postulate that an entrepreneurial mindset is positively related to attitude towards entrepreneurship, we believe that an entrepreneurial mindset will also enhance the development of specific competencies related to the exploitation of entrepreneurial opportunities. Therefore, we postulate:

*H8b: Entrepreneurial mindset has a positive effect on entrepreneurial competencies.*

## Entrepreneurial competencies and entrepreneurial intention

Previous studies have shown that personality influences a person's desire to become a business owner, as well as the relationship between entrepreneurship and emotional intelligence. For example, individuals with higher levels of emotional competencies have a more favorable attitude toward entrepreneurship and believe they are better suited to become entrepreneurs (Fernández-Pérez et al., 2019; Wegner et al., 2020). Firstly, unlike intellect and skills, competencies reveal that within certain settings, an individual is capable of transforming potential into actuality. Second, schooling may have an impact on such competencies and other cognitive characteristics. Various research carried out in educational contexts has indicated that training in entrepreneurial competencies may be advantageous to individuals (Velástegui & Chacón, 2021). Based on the above arguments, we posit the following hypothesis:

*H9: Entrepreneurial competencies have a positive effect on entrepreneurial intention.*

## The potential moderator effect of entrepreneurial passion

Entrepreneurial passion is a “consciously accessible intense positive feelings experienced by engagement in entrepreneurial activities associated with roles that are meaningful and salient to the self-identity of the entrepreneur” (Cardon et al., 2009, p. 517)., Philippe et al. (2010) described it simply as a strong desire to engage in certain behaviors. Creating a firm requires a high degree of skill to overcome the many barriers and issues that arise along the route (Biraglia & Kadile, 2016) As a result, entrepreneurial self-efficacy may be seen as a mediator in the relationship between entrepreneurial passion and entrepreneurial intent. The positive and significant association discovered between entrepreneurial passion and entrepreneurial self-efficacy provides a new determinant factor to previously identified elements that cause people to become entrepreneurs. Based on those arguments and empirical shreds of evidence, we propose the following hypothesis.

*H10a: Entrepreneurial passion moderates the relationship between attitude towards entrepreneurship and entrepreneurial intention.*

*H10b: Entrepreneurial passion moderates the relationship between social norms and entrepreneurial intention.*

*H10c: Entrepreneurial passion moderates the relationship between entrepreneurial self-efficacy and entrepreneurial intention.*

An integrated framework is shown in Fig. 1 and the portrayal of the mechanism of entrepreneurial mindset is shown in Fig. 2.

## Method

### Sample and data collection procedure

Hair et al. (2016) suggest that the sampling size rule should be as follows: the sample size should be 10 times larger than, or similar to, the largest numbers of path directions of a specific construct in a certain structural model. To achieve these criteria, during the first quarter of 2022, data were collected via a self-administered online survey to examine students’ entrepreneurial mindset, personal characteristics, entrepreneurial knowledge, cognitive antecedents, entrepreneurial competencies, and entrepreneurial intention. The survey began in January and ended at the end of March. Four hundred and seventy students who took entrepreneurship training were recruited from management college in Taiwan. It was emphasized that there were no right or wrong answers, and that all information provided by respondents would be kept confidential and anonymous (Podsakoff et al., 2003; Spector, 2006). A total of 422 questionnaires were returned, yielding an 89.78% response rate. The majority of respondents were male (59.24%). In terms of age, 51.19% were younger than 22 years (18–22), while 32.70% were between 23 and 25 years old. The remaining two groups comprised 10.66% (ages 26–30) and 5.45% (over 30). Regarding educational level, 61.37% of respondents were pursuing a bachelor’s degree, 31.28% were pursuing a master’s

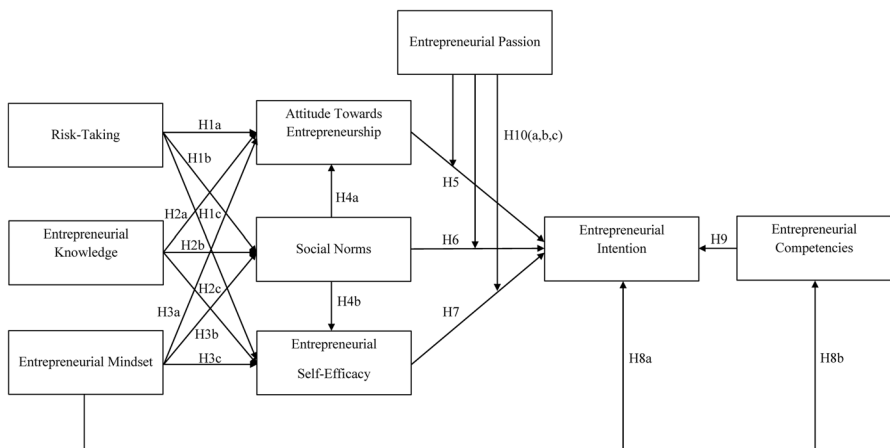
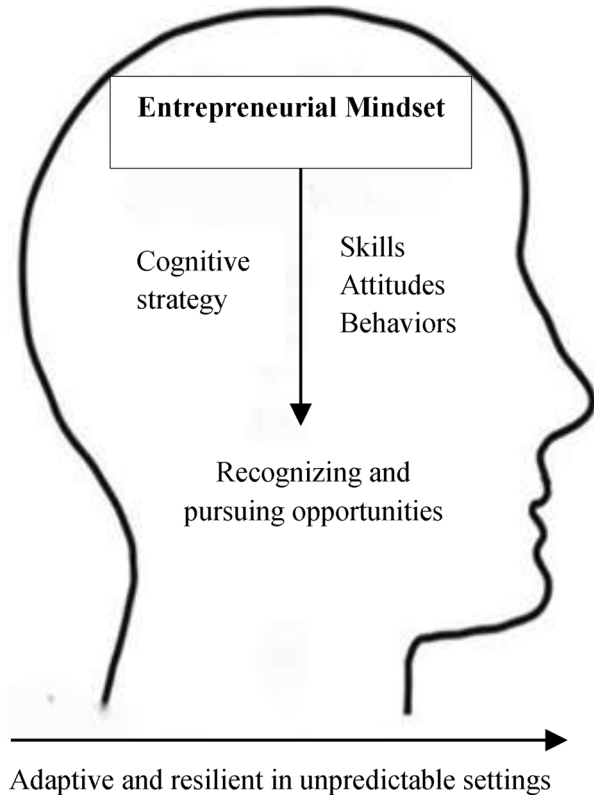


Fig. 1 Integrated framework

**Fig. 2** Portraying the mechanism of entrepreneurial mindset



degree, and the smallest group, 7.35%, were pursuing a doctoral degree. In terms of work experience, 68.25% had short-term work experience, while 31.75% had long-term experience. As for family background, 63.74% of respondents came from business-related families, compared with 36.26% from non-business families.

### Instruments and measures

The operational definitions and measurement items for each construct were also specified. A questionnaire was used to acquire data for this study. We adapted existing scales to measure the major concepts of interest since they were previously proven valid and reliable. A seven-point Likert scale was used in all items of the questionnaire, ranging from “1 = strongly disagree” to “7 = strongly agree.”

Firstly, to measure risk-taking, we used a six-item scale created by Sun et al. (2020) and Ahmed et al. (2020). Secondly, to assess entrepreneurial knowledge, the authors adopted a four-item scale from Liñán and Chen (2006). Thirdly, for measuring entrepreneurial mindset, the author used the six-item scale created by Handayati et al. (2020). To examine attitude toward entrepreneurship, we used a four-item scale developed by Liñán et al. (2011). In addition, to measure social norms, the authors utilized a three-item scale developed by Liñán and Chen (2006). We used a six-

item scale from De Noble et al. (1999) and Liñán (2008) to assess entrepreneurial self-efficacy.

Next, we utilized four items from Man et al. (2008) to measure entrepreneurial competencies. Additionally, we used six items from Liñán et al. (2011) to measure entrepreneurial intention. Finally, we utilized a five-item scale developed by Biraglia and Kadile (2016) to assess entrepreneurial passion. These items are shown in Table 1.

## Data analysis

### Assessment of measurement model

To estimate the measurement model, we employed the four approaches given by Hair et al. (2021) as follows: internal consistency, composite reliability, indicator reliability, and convergent and discriminant validity. First, composite dependability ratings were more than 0.70 minimal thresholds and showed internal consistency (Hair et al., 2021). Second, to determine convergent validity, the average variance extracted (AVE) of each concept was evaluated using a 0.50 threshold value (Hair et al., 2021). The AVE values in this research varied from 0.796 for attitude toward entrepreneurship to 0.611 for social norms, indicating that convergent validity is supported for this research. The results of the measurement model estimation are presented in Table 2.

The Fornell-Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait-Monotrait (HTMT) ratio (Hair et al., 2019) were used to assess discriminant validity, and it was discovered that all AVEs on the diagonals were greater than the corresponding row and column values in Table 3, indicating that measures were discriminant. Following the 0.85 cut-off value for proving discriminant validity, all HTMT ratio values in this investigation were less than 0.85, as can be seen in Table 4.

### Collinearity statistics

The software WarpPLS was used to perform a comprehensive collinearity test, as described by Kock and Lynn (2012), and to analyze both vertical and lateral collinearity simultaneously, as proposed by Kock and Gaskins (2014). Table 5 illustrates the Variance Inflation Factors (VIFs) obtained from a comprehensive collinearity test for each of the latent variables in this study's models. All the resulting VIFs are less than 3.3, indicating successful detection of common method bias based on the overall collinearity test approach.

### Testing hypotheses

Partial Least Square Structural Equation Modeling (PLS-SEM) was used to examine the main hypotheses. The structural model was validated by reporting the coefficient of determination ( $R^2$ ), path coefficient ( $\beta$ ), p-values, effect size ( $f^2$ ), and t-values using a bootstrapping approach with 5000 sub-samples as indicated by Hair et al. (2019).  $R^2$  has values between zero and 1, with a higher value suggesting more forecasting accuracy.  $R^2$  values of 0.19, 0.33, and 0.67 in PLS-SEM are perceived as

**Table 1** Scale items

Risk-Taking (mean=4.95, SD=1.06)	
RT1	If the potential reward was really high, I would not be hesitant to invest my money in a new firm that may fail
RT2	People have told me that I seem to relish taking risks
RT3	The prospect of making a business investment intrigues me
RT4	I adore taking risks
RT5	Taking risks does not concern me if the rewards are substantial
RT6	I would relish the challenge of a project that may result in a promotion or joblessness
Entrepreneurial Knowledge (mean=5.07 SD= 1.21)	
EK1	I know how to create a viable business because of my experience.
EK2	Because of my work expertise, I am familiar with the issues that my clients face
EK3	It is simple for me to locate business possibilities in my field of expertise
EK4	I am at ease at work since I understand how the firm operates
Entrepreneurial Mindset (mean=5.18, SD= 1.25)	
EM1	I considered interactions combining with entrepreneurial operations from both sides (opportunities or problems)
EM2	I have seen time set aside for business matters
EM3	I have considered the financial benefits of engaging in entrepreneurial pursuits
EM4	I investigated for both possibilities and obstacles associated with entrepreneurial endeavors
EM5	I have decided to explore entrepreneurial ideas for business opportunities
EM6	I discussed if it is advantageous for me to engage in entrepreneurial activities
Attitude Towards Entrepreneurship (mean=5.51, SD=1.12)	
ATE1	Being an entrepreneur appeals to me
ATE2	Given the opportunity and resources, I would like to launch a spin-off company
ATE3	Being an entrepreneur will provide me with a lot of fulfillment
ATE4	I think that if I decide to launch a spin-off firm, it will be successful
Social Norms (mean=4.09, SD=1.53)	
SNs1	Would my closest family members support my desire to start a business?
SNs2	Would my closest friends support my desire to start a business?
SNs3	Would my Colleagues and Mates support me if I wanted to start my own business?
Entrepreneurial Self-Efficacy (mean=5.36, SD=1.15)	
ESE1	I am capable of working efficiently in the face of constant stress, pressure, and disagreement
ESE2	I have the ability to generate fresh ideas and products
ESE3	I am capable at establishing and maintaining positive relationships with possible investors
ESE4	I have the ability to envision new markets for new products and services
ESE5	I can hire and train essential personnel
ESE6	I can create a work atmosphere that inspires individuals to attempt new things
Entrepreneurial Competencies (mean=4.45, SD=1.31)	
EC1	I identify products or services that clients desire
EC2	I cultivate long-term, trustworthy relationships with people
EC3	I can deal with others
EC4	I am aware of and working to improve my own flaws

**Table 1** (continued)

Entrepreneurial Intention (mean=5.10, SD=1.04)	
EI1	I am willing to go to any length to become a business owner
EI2	My professional ambition is to establish myself as an entrepreneur
EI3	I will make every attempt to establish and operate my own business
EI4	I am resolved to start a business in the future
EI5	I have seriously considered launching a business
EI6	I have a tremendous desire to open my own business eventually
Entrepreneurial Passion (mean=5.34, SD=1.18)	
EP1	It is exhilarating to start a new business
EP2	It will be exciting to watch a new company grow and succeed
EP3	I am inspired to find out ways to improve existing products/services
EP4	Scanning the surroundings for fresh prospects stimulates me much
EP5	Being a company owner might become a significant part of who I am

*SD* standard deviation

weak, medium, and strong, respectively (Hair et al., 2017). The impact size ( $f^2$ ) of the exogenous component is defined as the change in  $R^2$  value (Hair et al., 2017). Small, medium and large impacts are defined as  $f^2$  values of 0.02, 0.15, and 0.35, respectively.

The  $R^2$  values for the three endogenous latent constructs are 0.437 for attitude towards entrepreneurship, 0.168 for social norms, 0.408 for entrepreneurial self-efficacy, and 0.133 for entrepreneurial competencies, all of which are considered moderate and acceptable (Hair et al., 2016). Table 6 below shows the results of our analysis, indicating that all hypotheses are supported with the exception of H1b, H3b, and H8b. In terms of the impact of risk-taking on cognitive antecedents, H1a hypothesis asserts that risk-taking is positively associated with attitude towards entrepreneurship. As predicted, risk-taking was found to have a considerable influence on attitude towards entrepreneurship ( $\beta=0.265$ ,  $f^2=0.109$ ,  $t=3.948$   $p<.001$ ). Thus, H1a is confirmed. However, it stated that it has no significant effect of risk-taking on social norms ( $\beta=0.012$ ,  $f^2=0.000$ ,  $t=0.193$ ). Hence, H1b is not confirmed as previously said. Furthermore, as noted in the association between risk-taking and entrepreneurial self-efficacy, the findings revealed that risk-taking had a significant influence on entrepreneurial self-efficacy ( $\beta=0.260$ ,  $f^2=0.118$ ,  $t=3.864$   $p<.001$ ). Thus, H1c is confirmed.

In terms of the influence of entrepreneurial knowledge on cognitive factors, H2a reveals that entrepreneurial knowledge is positively associated with attitude towards entrepreneurship ( $\beta=0.253$ ,  $f^2=0.174$ ,  $t=4.298$ ,  $p<.001$ ). Hence, H2a is confirmed. Similarly, entrepreneurial knowledge influences social norms positively ( $\beta=0.198$ ,  $f^2=0.038$ ,  $t=2.919$ ,  $p<.001$ ) and entrepreneurial self-efficacy ( $\beta=0.248$ ,  $f^2=0.082$ ,  $t=4.105$ ,  $p<.001$ ). Thus, H2b and H2c are confirmed. These findings indicate a strong relationship between entrepreneurial knowledge, attitude towards entrepreneurship, and entrepreneurial self-efficacy, while social norms show a lower coefficient compared to the other cognitive antecedents, as shown in Table 6.

In terms of the association between entrepreneurial mindset and cognitive factors, entrepreneurial mindset has a positive effect on attitude towards entrepreneurship ( $\beta=0.153$ ,  $f^2=0.037$ ,  $t=2.296$ ,  $p<.01$ ). Thus, H3a is confirmed. In contrast, the

**Table 2** Reliability and convergent validity assessment

Construct items		Factor loading	Cronbach's alpha ( $\alpha$ )	AVE	Composite reliability
Risk-Taking (RT)	RT1	0.854	0.865	0.681	0.809
	RT2	0.885			
	RT3	0.804			
	RT4	0.891			
	RT5	0.803			
Entrepreneurial Knowledge (EK)	EK1	0.851	0.876	0.757	0.822
	EK2	0.827			
	EK3	0.876			
	EK4	0.848			
Entrepreneurial Mindset (EM)	EM1	0.833	0.827	0.732	0.780
	EM2	0.856			
	EM3	0.871			
	EM4	0.804			
	EM5	0.839			
Attitude towards Entrepreneurship (ATE)	ATE1	0.896	0.932	0.796	0.933
	ATE2	0.890			
	ATE3	0.910			
	ATE4	0.867			
Social Norms (SNs)	SN1	0.797	0.791	0.611	0.710
	SN2	0.781			
	SN3	0.772			
Entrepreneurial Self-Efficacy (ESE)	ESE1	0.883	0.915	0.743	0.896
	ESE2	0.891			
	ESE3	0.895			
	ESE4	0.899			
	ESE5	0.879			
	ESE6	0.864			
Entrepreneurial Competencies (ECs)	EC1	0.828	0.844	0.690	0.915
	EC2	0.836			
	EC3	0.857			
	EC4	0.814			
Entrepreneurial Intention (EI)	EI1	0.855	0.889	0.725	0.840
	EI2	0.880			
	EI3	0.881			
	EI4	0.892			
	EI5	0.879			
Entrepreneurial Passion (EP)	EP1	0.867	0.901	0.730	0.901
	EP2	0.879			
	EP3	0.876			
	EP4	0.815			
	EP5	0.881			

findings found that entrepreneurial mindset has no significant influence on social norms ( $\beta=0.105$ ,  $f^2=0.002$ ,  $t=1.914$ ). Hence, H3b is only marginally supported. In addition, entrepreneurial mindset was discovered to be significantly positive to entrepreneurial self-efficacy ( $\beta=0.319$ ,  $f^2=0.182$ ,  $t=4.224$ ,  $p<.001$ ). Therefore, H3c is confirmed. This finding indicates that an entrepreneurial mindset has the strongest positive effect on entrepreneurial self-efficacy.

In terms of the link between social norms and attitude towards entrepreneurship, H4a suggested that social norms are positively related to attitude towards entrepre-



**Table 3** Discriminant validity assessment

	ATE	EC	EI	EK	EM	ESE	RT	SNs
ATE	0.848							
EC	0.384	0.802						
EI	0.455	0.250	0.836					
EK	0.354	0.184	0.555	0.811				
EM	0.317	0.225	0.438	0.388	0.795			
ESE	0.344	0.238	0.518	0.346	0.440	0.846		
RT	0.230	0.254	0.303	0.368	0.334	0.513	0.828	
SNs	0.316	0.137	0.338	0.279	0.369	0.372	0.347	0.784

Diagonal elements (in bold) are the square root of AVE. Elements below the diagonal are the correlations among constructs

ATE Attitude towards Entrepreneurship, ECs Entrepreneurial Competencies, EE Entrepreneurial Education, EI Entrepreneurial Intention, EM Entrepreneurial Mindset, ESE Entrepreneurial Self-Efficacy, SNs Social Norms

**Table 4** Assessment of discriminant validity using HTMT

	ATE	EC	EI	EK	EM	ESE	RT	SNs
EC	0.312							
EI	0.406	0.391						
EK	0.315	0.363	0.324					
EM	0.383	0.206	0.355	0.305				
ESE	0.422	0.362	0.600	0.415	0.515			
RT	0.331	0.379	0.320	0.396	0.412	0.387		
SNs	0.275	0.121	0.286	0.295	0.340	0.359	0.261	

Diagonal elements (in bold) are the square root of AVE. Elements below the diagonal are the correlations among constructs

ATE Attitude Towards Entrepreneurship, ESE Entrepreneurial Self-Efficacy, EC Entrepreneurial Competencies, EK Entrepreneurial Knowledge, EM Entrepreneurial Mindset, EI Entrepreneurial Intention, RT Risk-Taking, SNs Social Norms

Source: Original study

**Table 5** Collinearity statistics

	Constructs	VIF
	Attitude Towards Entrepreneurship	2.122
	Entrepreneurial Self-Efficacy	2.838
	Entrepreneurial Knowledge	1.675
	Entrepreneurial Mindset	2.075
	Entrepreneurial Competencies	2.066
	Entrepreneurial Intention	2.284
	Risk-Taking	1.605
	Social Norms	1.419

Abbreviations: VIF variance inflation factor

Source: Original study

neurship. As expected, social norms were found to significantly affect attitude towards entrepreneurship ( $\beta=0.313$ ,  $f^2=0.109$ ,  $t=4.811$ ,  $p<.001$ ). Thus, H4a is confirmed. Furthermore, the study found that social norms significantly influence entrepreneurial self-efficacy ( $\beta=0.195$ ,  $f^2=0.48$ ,  $t=3.105$ ,  $p<.001$ ). Therefore, H4b is confirmed.

**Table 6** PLS main effects results

Hypotheses	$\beta$	SE	t-value	p value	LLCI	ULCI	Result
H1a Risk-Taking → Attitude Towards Entrepreneurship	0.265	0.067	3.948	0.000***	0.130	0.392	Supported
H1b Risk-Taking → Social Norms	0.012	0.061	0.193	ns	-0.106	0.131	Unsupported
H1c Risk-Taking → Entrepreneurial Self-Efficacy	0.260	0.065	3.864	0.000***	0.131	0.393	Supported
H2a Entrepreneurial Knowledge → Attitude Towards Entrepreneurship	0.253	0.059	4.298	0.000***	0.142	0.371	Supported
H2b Entrepreneurial Knowledge → Social Norms	0.192	0.066	2.919	0.001**	0.061	0.317	Supported
H2c Entrepreneurial Knowledge → Entrepreneurial Self-Efficacy	0.248	0.060	4.125	0.000***	0.134	0.366	Supported
H3a Entrepreneurial Mindset → Attitude Towards Entrepreneurship	0.153	0.064	2.296	0.003**	0.024	0.281	Supported
H3b Entrepreneurial Mindset → Social Norms	0.105	0.065	1.914	ns	-0.016	0.161	Unsupported
H3c Entrepreneurial Mindset → Entrepreneurial Self-Efficacy	0.319	0.068	4.224	0.000***	0.184	0.449	Supported
H4a Social Norms → Attitude Towards Entrepreneurship	0.313	0.061	4.811	0.000***	0.180	0.434	Supported
H4b Social Norms → Entrepreneurial Self-Efficacy	0.195	0.063	3.105	0.004**	0.071	0.319	Supported
H5 Attitude Towards Entrepreneurship → Entrepreneurial Intention	0.397	0.071	5.212	0.000***	0.171	0.443	Supported
H6 Social Norms → Entrepreneurial Intention	0.173	0.070	2.467	0.014*	0.026	0.301	Supported
H7 Entrepreneurial Self-Efficacy → Entrepreneurial Intention	0.283	0.067	4.522	0.000***	0.155	0.418	Supported
H8a Entrepreneurial Mindset → Entrepreneurial Intention	0.156	0.071	2.215	0.002**	0.017	0.292	Supported
H8b Entrepreneurial Mindset → Entrepreneurial Competencies	0.052	0.053	0.907	ns	-0.058	0.168	Unsupported
H9 Entrepreneurial Competencies → Entrepreneurial Intention	0.207	0.063	3.868	0.000***	0.155	0.316	Supported

\* $p \leq 0.05$ ; \*\* $p \leq 0.01$ ; \*\*\* $p \leq 0.001$ ; ns, not significant

*Abbreviations:*  $\beta$  standardized regression coefficient,  $p$  level of statistical significance,  $t$  calculated value of  $t$ , *LLCI* Lower-level confidence interval, *ULCI* Upper-level confidence interval; level of confidence = 95%; number of bootstrap samples = 5000; SE, standard error

Source: Original study

With respect to the link between cognitive factors and entrepreneurial intention, attitude toward entrepreneurship has a strongly positive effect on entrepreneurial intention ( $\beta=0.397$ ,  $f^2=0.179$ ,  $t=5.212$ ,  $p<.001$ ). Thus, H5 is confirmed. Similarly, social norms have a significant positive influence on entrepreneurial intention ( $\beta=0.173$ ,  $f^2=0.035$ ,  $t=2.467$ ,  $p<.01$ ). Hence, H6 is confirmed. Furthermore, the findings revealed that entrepreneurial self-efficacy significantly influenced entrepreneurial intention ( $\beta=0.283$ ,  $f^2=0.142$ ,  $t=4.522$ ,  $p<.001$ ). Therefore, H7 is confirmed. Based on these findings, the authors state that social norms have the lowest correlation with entrepreneurial intention when compared with other cognitive antecedents.

With regards to the association between entrepreneurial mindset and entrepreneurial intention, we discovered that entrepreneurial mindset is positively related to entrepreneurial intention ( $\beta=0.156$ ,  $f^2=0.092$ ,  $t=2.215$ ,  $p<.01$ ). Hence, H8a is confirmed. These findings suggest that entrepreneurial mindset indirectly affects entrepreneurial intention via the lens of cognitive antecedents (attitude toward entrepreneurship, social norms, and entrepreneurial self-efficacy) and has a direct effect on entrepreneurial intention. However, we found that entrepreneurial mindset has no significant effect on entrepreneurial competencies ( $\beta=0.052$ ,  $f^2=0.000$ ,  $t=0.907$ ). Thus, H8b is not confirmed. Lastly, this study indicates that entrepreneurial competencies are positively related to entrepreneurial intention ( $\beta=0.207$ ,  $f^2=0.165$ ,  $t=3.868$ ,  $p<.001$ ). Hence, H9 is confirmed.

The moderating effect of entrepreneurial passion on the link between cognitive variables and entrepreneurial intention was investigated. As shown in Table 7, the findings verified the hypothesis that entrepreneurial passion serves as a positive moderator in the relationship between attitude toward entrepreneurship and entrepreneurial intention ( $\beta=0.148$ ,  $t=3.115$ , 95% bias-corrected CI = [0.066, 0.293]). Thus, H10a is confirmed. However, the results reveal that entrepreneurial passion has no moderating influence on the link between social norms and entrepreneurial intention ( $\beta = -0.035$ ,  $t=0.443$ , 95% bias-corrected CI = [-0.019, 0.021]). Hence, H10b is not confirmed. Finally entrepreneurial passion has a significant moderating effect on the relationship between entrepreneurial self-efficacy and entrepreneurial

**Table 7** Moderation tests using PLS

Hypotheses	$\beta$	SE	t-value	p-value	LLCI	ULCI	Result
H10a Entrepreneurial Passion → Attitude Towards Entrepreneurship on Entrepreneurial Intention	0.148	0.065	3.115	0.000***	0,066	0.293	Supported
H10b Entrepreneurial Passion → Social Norms on Entrepreneurial Intention	-0.035	0.047	-0.443	ns	-0.019	0.021	Unsupported
H10c Entrepreneurial Passion → Entrepreneurial Self-Efficacy on Entrepreneurial Intention	0.126	0.063	2.841	0.001**	0.051	0,177	Supported

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ ; ns, not significant

*Abbreviations:*  $\beta$  standardized regression coefficient,  $p$  level of statistical significance,  $t$  calculated value of  $t$ , *LLCI* Lower-level confidence interval, *ULCI* Upper-level confidence interval; level of confidence=95%; number of bootstrap samples=5000; SE, standard error

Source: Original study

intention ( $\beta=0.126$ ,  $t=2.841$ , 95% bias-corrected CI = [0.051, 0.177]). Therefore, H10c is confirmed.

## Discussion

Firstly, in terms of risk-taking and cognitive factors, the significant impact of risk-taking propensity is a defining characteristic of entrepreneurship. Starting a company involves financial, psychological, and social risks, and individuals who can tolerate risk are more likely to pursue entrepreneurial ventures than those who cannot. These findings align with earlier research, which shows that risk-taking significantly influences attitudes toward entrepreneurship and entrepreneurial self-efficacy (Munir et al., 2019).

Secondly, regarding the link between entrepreneurial knowledge and cognitive antecedents, entrepreneurial knowledge has a strong positive impact on attitudes toward entrepreneurship. This study suggests that individuals with greater entrepreneurial knowledge are more likely to form accurate and favorable opinions about entrepreneurial activities. Entrepreneurial knowledge also has a significant influence on social norms and entrepreneurial self-efficacy, and this finding is in line with previous studies (Liñán et al., 2011; Farani et al., 2017). We confirmed what has previously been discussed by Bellò et al. (2018) that postulates that entrepreneurial knowledge in the early years of compulsory schooling can promote entrepreneurial self-efficacy and raise awareness of practices for managing entrepreneurial operations.

Thirdly, in terms of entrepreneurial mindset, our study suggests that an entrepreneurial mindset not only has a positive link with entrepreneurial intention, but also has an indirect impact via attitude toward entrepreneurship and entrepreneurial self-efficacy, in line with previous research (Samo & Hashim, 2016). When entrepreneurs gain the capacity to look at an issue or scenario, they will have a greater probability of success if they assess all relevant current evidence and make a confident decision to proceed (Liao et al., 2022a). However, this research discovered that there is no relationship between entrepreneurial mindset and entrepreneurial competencies.

Fourthly, regarding the association between cognitive antecedents and entrepreneurial intention, this study found that attitude towards entrepreneurship has a strong positive effect on entrepreneurial intention. This finding is in accordance with previous studies (Shahab et al., 2019; Nowiński et al., 2020): entrepreneurship attitude is one of the best factors which forms a person's intention, and subsequently, will directly affect behavior. Additionally, social norms have a significant effect on entrepreneurial intention, consistent with previous research (Vuković et al., 2017; Ephrem et al., 2019), suggesting that perceived social support during challenging circumstances is crucial for maintaining resilience. In terms of entrepreneurial self-efficacy and entrepreneurial intention, the findings indicate that entrepreneurial self-efficacy is strongly associated with entrepreneurial intention. This result is consistent with current research (Henley et al., 2017; Chien-Chi et al., 2020; Elnadi & Gheith, 2021; Liao et al., 2022b; Wang et al., 2023). We confirmed that increased confidence in one's own qualities and skills is essential in entrepreneurship, in line with Tomy and Pardede (2020). In numerous ways, self-efficacy boosts an individual's entrepre-

neurial intent to become an entrepreneur and their ability to successfully carry out entrepreneurial obligations.

Lastly, we tested the potential moderating effect of entrepreneurial passion on the relationship between cognitive antecedents and entrepreneurial intention. The findings indicate that entrepreneurial passion positively moderates the impact of entrepreneurial attitude and self-efficacy on entrepreneurial intention. This is consistent with other research (Liao et al., 2022a), which shows that students with positive entrepreneurial attitudes perceive themselves as more capable and motivated to create sustainable businesses. Their passion enhances their entrepreneurial attitudes, perceived desirability, and perceived feasibility of launching a sustainable business.

However, the study also notes that entrepreneurial passion has no significant effect on the relationship between social norms and entrepreneurial intention. This suggests that individuals with sufficient passion may disregard societal expectations (e.g., those of friends, family, or current business trends) and follow their own path to establish a unique business in the future.

### Theoretical and practical implications

The findings resonate with the Social Cognitive Theory (SCT) tenets. It postulates that when armed with robust self-efficacy, a compelling desire, cognitive resources, and a well-mapped strategy, individuals are better poised to craft and pursue business aspirations. This empirical corroboration with SCT further accentuates the intricate interplay between cognitive factors like mindset and external environments, revealing a positive correlation with student entrepreneurial ambitions.

This study has several academic and managerial implications. From a theoretical point of view, we firstly enrich existing literature on risk-taking and entrepreneurial intention by arguing that entrepreneurs must accept stepping out of their comfort zone and taking risks since it affects the survival of the business in the age of constantly developing digital technology. For example, Kodak was once a dominant player in the global photographic market, controlling nearly 80% of the market in the mid-20th century. However, its downfall in 2012 was due to ignoring new technologies and failing to adapt to market changes. Kodak resisted digital cameras, fearing they would harm its film business, highlighting the argument that greater risk-taking increases the chances of success. Future research could expand the relationship between risk-taking and entrepreneurial intention.

Secondly, we also expand upon the work of Liñán (2004); Liao et al. (2022b) by providing an insight into the differences between formal and informal entrepreneurial knowledge. We argue that entrepreneurs acquire formal entrepreneurial knowledge through courses (classrooms, online courses, seminars, e-learning portals, etc.) or training programs in an organization or workplace (on-the-job training, workshops, mentoring, coaching, job shadowing, etc.). Formal knowledge is an important but insufficient criterion since it only gives entrepreneurs fundamental knowledge during the start-up period. The difference between ordinary entrepreneurs and those who achieve great success in society is informal entrepreneurial knowledge (family, mass media, social networking, prior experience, et, c). Informal entrepreneurial knowledge is a critical notion; it helps entrepreneurs remain aware of rapid technical

and economic developments, and it also reflects the steps in developing a successful career.

Thirdly, we suggest that an entrepreneurial mindset plays an important role in altering cognitive antecedents since it unlocks the entrepreneur's power within. It promotes personal traits by providing positive thinking and self-confidence for pursuing entrepreneurial intention. Individuals with higher entrepreneurial mindset have a willingness to fail, learn, and adapt. Additionally, we extend the work of Liao et al. (2022a, b) by portraying the effect mechanism of entrepreneurial mindset in three folds: (1) entrepreneurs establish a cognitive strategy via creativity, innovation, confidence, and forward-thinking approaches to accomplishing things; (2) recognizing and pursuing possibilities; (3) being adaptive and resilient in coping with unanticipated settings.

Next, we agreed with Mirakyan and Berezka (2020) that entrepreneurial competencies are vital to develop a sustainable business. We propose that entrepreneurial competencies are a set of skills (financial management, risk management, leadership, social networking, technology, market strategy, etc.). However, it is crucial to recognize the proper skills that flourish and compete in an age of rapidly changing technologies. In addition, we add literature on entrepreneurial intention by proposing that entrepreneurs should acquire a sum of entrepreneurial skills in the short term. In the long term, entrepreneurs should concentrate on specialist skills to make sustainable growth possible for their enterprises.

Our work is also beneficial for practitioners and policymakers. In line with previous research, we confirmed the role of entrepreneurial knowledge in promoting and sustaining entrepreneurial intentions. Therefore, entrepreneurs should dedicate part of their time to training. Our study reveals that formal knowledge is necessary but not sufficient. To make a difference and compete in the era of digital evolution, entrepreneurs need to arm themselves with informal knowledge that can be learned outside of the college or via prior experience to raise their ability to endure pressure, challenges, and patience. The outcomes of this research carry pragmatic ramifications also for educational policymakers and curriculum designers. A focused emphasis on entrepreneurial knowledge, both theoretical and experiential, could potentially serve as a catalyst for fostering a new generation of adept entrepreneurs. Therefore, government agencies and educational institutions should consider this evidence when designing initiatives aimed at nurturing entrepreneurial spirit among youth, ensuring they are equipped with the requisite cognitive tools and knowledge base.

Our study also illustrates the positive effect of risk-taking behavior both on attitudes towards entrepreneurship and self-efficacy, suggesting that the ability to take risks can sometimes be a key to entrepreneurial success. However, the fear of failure often holds individuals back from taking risks. To address this, institutions and universities should work together to foster a culture where failure is accepted as part of the learning process. By normalizing failure and encouraging resilience, these environments can empower people to take risks without fear, ultimately driving innovation and entrepreneurial growth.

## Limitations and future research

Our work is not without limitations, which offers opportunities for future research. Firstly, our study is based on self-reported data, focused solely on entrepreneurial students from a single country, Taiwan. While this provides valuable insights, it also limits the generalizability of our findings. Future research could broaden our framework by including actual entrepreneurs as participants, allowing for a more comprehensive understanding of entrepreneurial behavior. Additionally, cross-country comparisons would provide further insight into how cultural and economic differences influence the relationships between entrepreneurial attitudes, self-efficacy, and intention, offering a more global perspective on these dynamics. This is in line with recent results showing that country plays a moderating role in the relationships between personality traits and entrepreneurial intentions (Kryeziu et al., 2024).

Secondly, our model includes entrepreneurial students which could represent potential future entrepreneurs but limit our analysis in terms of entrepreneurial characteristics. In line with recent studies that highlight the importance of entrepreneurial life cycles (Mbena et al., 2023), future research could propose our model to real entrepreneurs at different business stages. Entrepreneurial competencies are likely to vary across these stages, and we believe that the psychological antecedents discussed in our model—such as risk-taking, self-efficacy, and social norms—would also play different roles depending on the stage of the entrepreneurial journey. Researching these dynamics further would benefit universities and government bodies, enabling them to tailor entrepreneurial courses to be as specific as possible to the type of entrepreneur and the phase of business development.

Lastly, while this study has shed light on the intricate interplay of TPB and SCT in the realm of entrepreneurial intentions, future investigations could delve deeper into the moderating and mediating roles of other cognitive and demographic factors, as discussed by recent studies such as Palmer et al. (2021) who incorporate the effects of role modelling from childhood on competence beliefs. To conclude, longitudinal studies could provide insights into the evolution of entrepreneurial intentions over time and the sustainability of educational interventions in fostering these intentions.

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## References

- Abbas, M. K., Osunsan, O. K., & Muhammad, K. (2020). Social norms and entrepreneurial intent of graduating university students in North West Nigeria. *European Journal of Business and Management Research*, 5(2), 1–5. <https://doi.org/10.24018/ejbmr.2020.5.2.232>

- Ahmed, M. A., Khattak, M. S., & Anwar, M. (2020). Personality traits and entrepreneurial intention: The mediating role of risk aversion. *Journal of Public Affairs*, 1–15. <https://doi.org/10.1002/pa.2275>
- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology*, 52(1), 27–58. <https://doi.org/10.1146/annurev.psych.52.1.27>
- Ajzen, I. (2005). *Attitudes, Personality and Behaviour* (2nd ed.). Open University Press/McGraw-Hill.
- Ajzen, I., & Cote, N. G. (2008). Attitudes and the prediction of behaviour. In W. D. Crano, & R. Prislin (Eds.), *Attitudes and attitude change*, (pp. 289–311). Psychology Press.
- Aloulou, W. J. (2016). Predicting entrepreneurial intentions of final year Saudi university business students by applying the theory of planned behavior. *Journal of Small Business and Enterprise Development*, 23(4), 1142–1164. <https://doi.org/10.1108/JSBED-02-2016-0028>
- Alshebami, A., & Seraj, A. H. A. (2022). Exploring the influence of potential entrepreneurs' personality traits on small venture creation: The case of Saudi Arabia. *Frontiers in Psychology*, 13, 885980. <https://doi.org/10.3389/fpsyg.2022.885980>
- Andriani, M., Samadhi, T. M. A. A., Joko, S., & Suryadi, K. (2018). Aligning Business Process Maturity Level with SMEs Growth in Indonesian Fashion Industry. *International Journal of Organizational Analysis*, 26(4), 709–727. <https://doi.org/10.1108/IJOA-08-2017-1215>
- Anjum, T., Amoozegar, A., Farrukh, M., & Heidler, P. (2022). Entrepreneurial intentions among business students: The mediating role of attitude and the moderating role of university support. *Education and Training*, 1–20. <https://doi.org/10.1108/ET-01-2021-0020>
- Bandura, A. (1986). *Social foundation of thought and action: A social cognitive theory*. Prentice Hall.
- Bandura, A. (1989). Human agency in social cognitive theory. *The American Psychologist*, 44, 1175–1184. <https://doi.org/10.1037/0003-066X.44.9.1175>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1–26. <https://doi.org/10.1146/annurev.psych.52.1.1>
- Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares, & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents Greenwich* (Vol. 5, pp. 307–337). Information Age Publishing.
- Baranowski, T., Perry, C. L., & Parcel, G. S. (2002). How individuals, environments, and health behavior interact. In B. K. R. Karen, F. M. Glanz, & Lewis (Eds.), *Health Behavior and Health Education: Theory, Research and Practice* (pp. 165–184). Jossey-Bass.
- Begley, T. M., & Boyd, D. P. (1987). A comparison of entrepreneurs and managers of small business firms. *Journal of Management*, 13, 99–108. <https://doi.org/10.1177/014920638701300108>
- Bellò, B., Mattana, V., & Loi, M. (2018). The power of peers: A new look at the impact of creativity, social context and self-efficacy on entrepreneurial intentions. *International Journal of Entrepreneurial Behavior & Research*, 24(1), 214–233. <https://doi.org/10.1108/IJEBR-07-2016-0205>
- Biraglia, A., & Kadile, V. (2016). The role of entrepreneurial passion and creativity in developing entrepreneurial intentions: Insights from American homebrewers. *Journal of Small Business Management*, 55(1), 170–188. <https://doi.org/10.1111/jsbm.12242>
- Boyd, N. G., & Vozikis, G. S. (1994). The Influence of Self-Efficacy on the Development of Entrepreneurial Intentions and Actions. *Entrepreneurship Theory and Practice*, 18(4), 63–77. <https://doi.org/10.1177/104225879401800404>
- Caputo, A., Lombardi, R., Akeel, F., Almallah, H., Dakkak, B., & Quabbaj, N. (2016). Youth employment in start-up ventures in Jordan: An exploratory study. *International Journal of Entrepreneurship and Small Business*, 28(4), 468–491. <https://doi.org/10.1504/IJESB.2016.077574>
- Cardon, M. S., Wincent, J., Singh, J., & Drnovsek, M. (2009). The nature and experience of entrepreneurial passion. *Academy of Management Review*, 34(3), 511–532.
- Chien-Chi, C., Sun, B., Yang, H., Zheng, M., & Li, B. (2020). Emotional competence, entrepreneurial self-efficacy, and entrepreneurial intention: A study based on China college students' social entrepreneurship project. *Frontiers in Psychology*, 11, 1–13. <https://doi.org/10.3389/fpsyg.2020.547627>
- Cui, J., & Bell, R. (2022). Behavioural entrepreneurial mindset: How entrepreneurial education activity impacts entrepreneurial intention and behaviour. *The International Journal of Management Education*, 20(2), 100639. <https://doi.org/10.1016/j.ijme.2022.100639>
- Cui, J., Sun, J., & Bell, R. (2019). The impact of entrepreneurship education on the entrepreneurial mindset of college students in China: The mediating role of inspiration and the role of educational attributes. *The International Journal of Management Education*, 1–16. <https://doi.org/10.1016/j.ijme.2019.04.001>



- Dana, L.-P. (2014). Asian models of entrepreneurship: From the Indian union and Nepal to the Japanese archipelago. *World Scientific*, 9, 1–424.
- Daspit, J. J., Fox, C. J., & Findley, S. K. (2021). Entrepreneurial mindset: An integrated definition, a review of current insights, and directions for future research. *Journal of Small Business Management*, 61(1), 12–44. <https://doi.org/10.1080/00472778.2021.1907583>
- De Noble, A. F., Jung, D., & Ehrlich, S. B. (1999). Entrepreneurial self-efficacy: The development of a measure and its relationship to entrepreneurial action. In *Frontiers for Entrepreneurship Research*, pp. 73–78.
- Densberger, K. (2014). The Self-Efficacy and Risk-Propensity of Entrepreneurs. *Journal of Enterprising Culture*, 2(4), 437–462. <https://doi.org/10.1142/S0218495814500186>
- Elnadi, M., & Gheith, M. H. (2021). Entrepreneurial ecosystem, entrepreneurial self-efficacy, and entrepreneurial intention in higher education: Evidence from Saudi Arabia. *The International Journal of Management Education*, 19, 1–16. <https://doi.org/10.1016/j.ijme.2021.100458>
- Engle, R. L., Dimitriadi, N., Gavidia, J. V., Schlaegel, C., Delanoe, S., Alvarado, I., He, X., Buame, S., & Wolff, B. (2010). Entrepreneurial intent: A twelve-country evaluation of Ajzen's model of planned behavior. *International Journal of Entrepreneurial Behavior & Research*, 16(1), 35–57. <https://doi.org/10.1108/13552551011020063>
- Ephrem, A. N., Namatovu, R., & Basalirwa, E. M. (2019). Perceived social norms, psychological capital and entrepreneurial intention among undergraduate students in Bukavu. *Education + Training*, 61(7/8), 963–983. <https://doi.org/10.1108/ET-10-2018-0212>
- Farani, Y. A., Karimi, S., & Motaghd, M. (2017). The role of entrepreneurial knowledge as a competence in shaping Iranian students' career intentions to start a new digital business. *European Journal of Training and Development*, 41(1), 83–100. <https://doi.org/10.1108/EJTD-07-2016-0054>
- Fernández-Pérez, V., Montes-Merino, A., Rodríguez-Ariza, L., & Galicia, P. E. A. (2019). Emotional competencies and cognitive antecedents in shaping student's entrepreneurial intention: The moderating role of entrepreneurship education. *International Entrepreneurship and Management Journal*, 15(1), 281–305. <https://doi.org/10.1007/s11365-017-0438-7>
- Fornell, C. G., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.2307/3151312>
- GEM (Global Entrepreneurship Monitor) (2023). *Global entrepreneurship monitor 2022/2023 global report: Adapting to a "New Normal"*. GEM.
- Gilaninia, S., & Alipour, H. R. (2013). Effective Factors on Students' Entrepreneurial Intent of Islamic Azad University of Rasht Branch. *Interdisciplinary Journal of Contemporary Research in Business*, 5(5), 317–331.
- Gorgievski, M. I., Stephan, U., Laguna, M., & Moriano, J. A. (2017). Predicting entrepreneurial career intentions: Values and the theory of planned behavior. *Journal of Career Assessment*, 26(3), 457–475. <https://doi.org/10.1177/1069072717714541>
- Gupta, P., Chauhan, S., Paul, J., & Jaiswal, M. P. (2020). Social entrepreneurship research: A review and future research agenda. *Journal of Business Research*, 113, 209–229. <https://doi.org/10.1016/j.jbusres.2020.03.032>
- Gürol, Y., & Atsan, N. (2006). Entrepreneurial characteristics amongst university students. *Education + Training*, 48(1), 25–38. <https://doi.org/10.1108/00400910610645716>
- Hair, J. F., Hollingsworth, C. L., Randolph, A., & Chong, A. Y. L. (2017). An updated and expanded assessment of PLS-SEM in information systems research. *Industrial Management & Data Systems*, 117(3), 442–458. <https://doi.org/10.1108/IMDS-04-2016-0130>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage Publications.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Evaluation of reflective measurement models. In *Classroom companion: business* (pp. 75–90). [https://doi.org/10.1007/978-3-030-80519-7\\_4](https://doi.org/10.1007/978-3-030-80519-7_4)
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Halbusi, H. A., Soto-Acosta, P., & Popa, S. (2023). Analysing e-entrepreneurial intention from the theory of planned behaviour: The role of social media use and perceived social support. *International Entrepreneurship and Management Journal*, 19(4), 1611–1642. <https://doi.org/10.1007/s11365-023-00866-1>

- Handayati, P., Wulandari, D., Soetjipto, B. E., Wibowo, A., & Narmaditya, B. S. (2020). Does entrepreneurship education promote vocational students' entrepreneurial mindset? *Heliyon*, 6(11), e05426. <https://doi.org/10.1016/j.heliyon.2020.e05426>
- Henley, A., Contreras, F., Espinosa, J. C., & Barbosa, D. (2017). Entrepreneurial intentions of Colombian business students: Planned behaviour, leadership skills and social capital. *International Journal of Entrepreneurial Behavior & Research*, 23(6), 1017–1032. <https://doi.org/10.1108/IJEBR-01-2017-0031>
- Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2005). *Entrepreneurship* (6th ed.). McGraw-Hill/Irwin.
- Holcomb, T. R., Ireland, R. D., Holmes Jr, R. M., & Hitt, M. A. (2009). Architecture of entrepreneurial learning: Exploring the link among heuristics, knowledge, and action. *Entrepreneurship theory and practice*, 33(1), 167–192.
- Homer, S. T., & Lim, W. M. (2023). Theory development in a globalized world: Bridging doing as the romans do with understanding why the romans do it. *Global Business and Organizational Excellence*, pp. 1–12. <https://doi.org/10.1002/joe.22234>
- Jiatong, W., Murad, M., Bajun, F., Tufail, M. S., Mirza, F., & Rafiq, M. (2021). Impact of entrepreneurial education, mindset, and creativity on entrepreneurial intention: Mediating role of entrepreneurial self-efficacy. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.724440>
- Karimi, S. (2019). The role of entrepreneurial passion in the formation of students' entrepreneurial intentions. *Applied Economics*, 52, 331–344. <https://doi.org/10.1177/10525629241263801>
- Knight, F. H. (1921). *Risk, uncertainty and profit*. Houghton Mifflin Company.
- Kock, N., & Gaskins, L. (2014). The mediating role of voice and accountability in the relationship between Internet diffusion and government corruption in Latin America and Sub-Saharan Africa. *Information Technology for Development*, 20(1), 23–43. <https://doi.org/10.1080/02681102.2013.832129>
- Kock, N., & Lynn, G. S. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. *Journal of the Association for Information Systems*, 13(7), 546–580. <https://doi.org/10.17705/1jais.00302>
- Krueger, J. N. F., & Carsrud, A. L. (1993). Entrepreneurial intentions: Applying the theory of planned behaviour. *Entrepreneurship & Regional Development*, 5, 315–330. <https://doi.org/10.1080/08985629300000020>
- Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, 15 No(6), 411–432. [https://doi.org/10.1016/S0883-9026\(98\)00033-0](https://doi.org/10.1016/S0883-9026(98)00033-0)
- Kryeziu, L., Bağış, M., Kurutkan, M. N., & Ateş, Ç. (2024). Dark triad personality, motivational dynamics and nascent entrepreneurs entrepreneurial intentions: Cross-country comparison. *International Entrepreneurship and Management Journal*. <https://doi.org/10.1007/s11365-024-01001-4>
- Kuratko, D. F., Fisher, G., & Audretsch, D. B. (2020). Unraveling the entrepreneurial mindset. *Small Business Economics*, 57(1), 1681–1691. <https://doi.org/10.1007/s11187-020-00372-6>
- Kyriakopoulos, P., Herbert, K., & Piperopoulos, P. (2024). I am passionate therefore I am: The interplay between entrepreneurial passion, gender, culture and intentions. *Journal of Business Research*, 172, 1–13. <https://doi.org/10.1016/j.jbusres.2023.114409>
- Liao, Y. K., Nguyen, V. H. A., Chi, H. K., & Nguyen, H. H. (2022a). Unraveling the direct and indirect effects of entrepreneurial education and mindset on entrepreneurial intention: The moderating role of entrepreneurial passion. *Global Business and Organizational Excellence*, 41(3), 1–18.
- Liao, Y. K., Nguyen, V. H. A., & Caputo, A. (2022b). Unveiling the role of entrepreneurial knowledge and cognition as antecedents of entrepreneurial intention: A meta-analytic study. *International Entrepreneurship and Management Journal*, 18(4), 1623–1652. <https://doi.org/10.1007/s11365-022-00803-8>
- Liñán, F. (2004). Intention-based models of entrepreneurship education. *Piccola Impresa/ Small Business*, 3, 11–35.
- Liñán, F. (2008). Skill and value perceptions: How do they affect entrepreneurial intentions? *International Entrepreneurship and Management Journal*, 4(3), 257–272. <https://doi.org/10.1007/s11365-008-0093-0>
- Liñán, F., & Chen, Y. W. (2006). Testing the entrepreneurial intention model on a two-country sample. Working Papers 0607, Departament Empresa, Universitat Autònoma de Barcelona, *Journal of Applied Social Psychology*.
- Liñán, F., Nabi, G., & Krueger, N. F. (2013). British and Spanish entrepreneurial intentions: A comparative study. *Revista de Economía Mundial*, 33, 73–107. <https://doi.org/10.33776/rem.v0i33.4761>
- Liñán, F., Urbano, D., & Guerrero, M. (2011). Regional variations in entrepreneurial cognitions: Start-up intentions of university students in Spain. *Entrepreneurship and Regional Development*, 23, 3–4. <https://doi.org/10.1080/08985620903233929>

- Man, T. W. Y., Lau, T., & Snape, E. (2008). Entrepreneurial competencies and the performance of small and medium enterprises: An investigation through a framework of competitiveness. *Journal of Small Business & Entrepreneurship*, 21(3), 257–276. <https://doi.org/10.1080/08276331.2008.10593424>
- Mathisen, J. E., & Arnulf, J. K. (2013). Competing mindsets in entrepreneurship: The cost of doubt. *The International Journal of Management Education*, 11(3), 132–141. <https://doi.org/10.1016/j.ijme.2013.03.003>
- Mbena, J. Y., Durst, S., Kraus, S., & Viala, C. (2023). Investigating the impact of the dynamics of entrepreneurial intentions on ventures' formalization. *Journal of Entrepreneurship in Emerging Economies*. <https://doi.org/10.1108/jeece-01-2023-0007>
- Mehtap, S., Pellegrini, M. M., Caputo, A., & Welsh, D. H. B. (2017). Entrepreneurial intentions of young women in the Arab world. *International Journal of Entrepreneurial Behavior & Research*, 23(6), 880–902. <https://doi.org/10.1108/IJEBR-07-2017-0214>
- Memon, M., Soomro, B. A., & Shah, N. (2019). Enablers of entrepreneurial self-efficacy in a developing country. *Education and Training*, 61(6), 684–699. <https://doi.org/10.1108/ET-10-2018-0226>
- Mill, J. S. (1848). *Principles of political economy with some of their applications to social philosophy*. John W. Parker.
- Mirakyan, A., & Berezka, S. (2020). Why entrepreneurial competencies are essential for business and management specialists in the digital economy age? In *Communications in computer and information science* (pp. 373–386). [https://doi.org/10.1007/978-3-030-65218-0\\_28](https://doi.org/10.1007/978-3-030-65218-0_28).
- Miralles, F., Giones, F., & Riverola, C. (2015). Evaluating the impact of prior experience in entrepreneurial intention. *International Entrepreneurship and Management Journal*, 12(3), 791–813. <https://doi.org/10.1007/s11365-015-0365-4>
- Mitchelmore, S., & Rowley, J. (2010). Entrepreneurial competencies: A literature review and development agenda. *International Journal of Entrepreneurial Behavior & Research*, 16(2), 92–111. <https://doi.org/10.1108/13552551011026995>
- Morris, M. H., Webb, J. W., Fu, J., & Singhal, S. (2013). A competency-based perspective on entrepreneurship education: Conceptual and empirical insights. *Journal of Small Business Management*, 51(3), 352–369. <https://doi.org/10.1111/jsbm.12023>
- Munir, H., Jianfeng, C., & Ramzan, S. (2019). Personality traits and theory of planned behavior comparison of entrepreneurial intentions between an emerging economy and a developing country. *International Journal of Entrepreneurial Behaviour & Research*, 25(3), 554–580. <https://doi.org/10.1108/IJEBR-05-2018-0336>
- Naumann, C. (2017). Entrepreneurial mindset: A synthetic literature review. *Entrepreneurial Business and Economics Review*, 5(3), 149–172. <https://doi.org/10.15678/EBER.2017.050308>
- Nikou, S., Brush, C., & Wraae, B. (2023). Entrepreneurship educators: A configurational analysis of factors influencing pedagogical choices. *International Journal of Entrepreneurial Behavior & Research*, 29(11), 81–108. <https://doi.org/10.1108/IJEBR-08-2022-0760>
- Nowiński, W., Haddoud, M. Y., Wach, K., & Schaefer, R. (2020). Perceived public support and entrepreneurship attitudes: A little reciprocity can go a long way! *Journal of Vocational Behavior*, 121, 1–16. <https://doi.org/10.1016/j.jvb.2020.103474>
- Nwosu, H. E., Obidike, P. C., Ugwu, J. N., Udeze, C. C. and Okolie, U. C. (2022). Applying social cognitive theory to placement learning in business firms and students' entrepreneurial intentions. *The International Journal of Management Education*, 20(1), 100602. <https://doi.org/10.1016/j.ijme.2022.100602>
- Palalić, R., Ramadani, V., Đilović, A., Dizdarević, A., & Ratten, V. (2017). Entrepreneurial intentions of university students: a case-based study. *Journal of Enterprising Communities: People and Places in the Global Economy*, 11(03), 393–413. <https://doi.org/10.1108/JEC-12-2016-0046>
- Palmer, C., Fasbender, Ú., Kraus, S., Birkner, S., & Kailer, N. (2021). A chip off the old block? The role of dominance and parental entrepreneurship for entrepreneurial intention. *Review of Managerial Science*, 15(2), 287–307. <https://doi.org/10.1007/s11846-019-00342-7>
- Patrício, L. D., & Ferreira, J. J. (2023). Unlocking the connection between education, entrepreneurial mindset, and social values in entrepreneurial activity development. *Review of Managerial Science*. <https://doi.org/10.1007/s11846-023-00629-w>
- Pérez-Pérez, C., González-Torres, T., & Nájera-Sánchez, J. J. (2021). Boosting entrepreneurial intention of university students: Is a serious business game the key? *The International Journal of Management Education*, 100506. <https://doi.org/10.1016/j.ijme.2021.100506>
- Pfeifer, S., Šarlija, N., & Zekić Sušac, M. (2016). Shaping the entrepreneurial mindset: Entrepreneurial Intentions of business students in Croatia. *Journal of Small Business Management*, 54(1), 102–117. <https://doi.org/10.1111/jsbm.12133>

- Philippe, F. L., Vallerand, R. J., Houliort, N., Lavigne, G. L., & Donahue, E. G. (2010). Passion for an activity and quality of interpersonal relationships: The mediating role of emotions. *Journal of Personality and Social Psychology*, 98 No(6), 917–932. <https://doi.org/10.1037/a0018017>
- Phong, N. D., Thao, N. T. P., & Nguyen, N. P. (2020). Entrepreneurial intent of business students: Empirical evidence from a transitional economy. *Cogent Business & Management*, 7 No(1), 1–18. <https://doi.org/10.1080/23311975.2020.1747962>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88 No(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Raider, H. J., & Burt, R. S. (1996). Boundaryless careers and social capital. In M. B. Arthur, & D. M. Rousseau (Eds.), *The boundaryless career: A new employment principle for a new organizational era*, (Vol. 42, pp. 187–200). Oxford University Press.
- Ramadani, V., Rahaman, R., Salamzadeh, M. S., A., & Abazi-Alili, H. (2022). Entrepreneurship education and graduates' entrepreneurial intentions: Does gender matter? A multi-group analysis using AMOS. *Technological Forecasting and Social Change*, 180, 121693. <https://doi.org/10.1016/j.techfore.2022.121693>
- Rana, K. S., Abid, G., & Ahmad, M. (2021). The influence of social norms and entrepreneurship knowledge on entrepreneurship intention: The mediating role of personal attitude. *International Journal of Entrepreneurship*, 25 No(1S), 1–8.
- Ripollés, M., & Blesa, A. (2023). Moderators of the effect of entrepreneurship education on entrepreneurial action. *International Journal of Entrepreneurial Behavior & Research*, 29 No, 1402–1426. <https://doi.org/10.1108/IJEBR-06-2022-0518>
- Samo, A. H., & Hashim, N. (2016). The impact of entrepreneurial alertness on entrepreneurial intentions. *Journal of International Business Research and Marketing*, 1 No(6), 7–11. <https://doi.org/10.18775/jibrm.1849-8558.2015.16.3001>
- Scafarto, A., Poggese, S., & Mari, M. (2019). Entrepreneurial intentions, risk-taking propensity and environmental support: The Italian experience. In Caputo, A., Pellegrini, M. M. (Eds.), *The Anatomy of Entrepreneurial Decisions, Contributions to Management Science*, Springer Nature Switzerland AG 2019.
- Secundo, G., Mele, G., Sansone, G., & Paolucci, E. (2020). Entrepreneurship education centres in universities: Evidence and insights from Italian contamination lab cases. *International Journal of Entrepreneurial Behavior & Research*, 26 No(6), 1311–1333. <https://doi.org/10.1108/IJEBR-12-2019-0687>
- Shahab, Y., Chengang, Y., Arbizu, A. D., & Haider, M. J. (2019). Entrepreneurial self-efficacy and intention: Do entrepreneurial creativity and education matter? *International Journal of Entrepreneurial Behavior & Research*, 25 No(2), 259–280. <https://doi.org/10.1108/IJEBR-12-2017-0522>
- Shapiro, A. & Sokol, L. (1982). The social dimensions of entrepreneurship. In C. A. Kent, D. L. Sexton, & K. H. Vesper (Eds.), *Encyclopedia of entrepreneurship*, (pp. 72–90). Prentice-Hall.
- Spector, P. E. (2006). Method variance in organizational research: Truth or urban legend? *Organizational Research Methods*, 9(2), 221–232. <https://doi.org/10.1177/1094428105284955>
- Sukavejworakit, K., Promsiri, T., & Virasa, T. (2018). OETEL: An innovative teaching model for entrepreneurship education. *Journal of Entrepreneurship Education*, 21(2), 1–11.
- Sun, H., Ni, W., Teh, P. L., & Lo, C. (2020). The systematic impact of personal characteristics on entrepreneurial intentions of engineering students. *Frontiers in Psychology*, 11, 1–15. <https://doi.org/10.3389/fpsyg.2020.01072>
- Tomy, S., & Pardede, E. (2020). An entrepreneurial intention model focussing on higher education. *International Journal of Entrepreneurial Behavior & Research*, 26(7), 1423–1447. <https://doi.org/10.1108/IJEBR-06-2019-0370>
- Velástegui, O. V., & Chacón, S. C. (2021). Emotional competencies and entrepreneurial intention: An extension of the theory of planned behavior case of Ecuador. *Cogent Business & Management*, 8(1), 1–18. <https://doi.org/10.1080/23311975.2021.1943242>
- Vuković, K., Kedmenec, I., Postolov, K., Jovanovski, K., & Korent, D. (2017). The role of bonding and bridging cognitive social capital in shaping entrepreneurial intention in transition economies. *Management: Journal of Contemporary Management*, 22(1), 1–33. <https://doi.org/10.30924/mjcmi/2017.22.1.1>
- Wang, X. H., You, X., Wang, H. P., Wang, B., Lai, W. Y., & Su, N. (2023). The Effect of Entrepreneurship Education on Entrepreneurial Intention: Mediation of Entrepreneurial Self-Efficacy and Moderating Model of Psychological Capital. *Sustainability*, 15, 2562. <https://doi.org/10.3390/su15032562>

- Wegner, D., Thomas, E., Teixeira, E. K., & Maehler, A. E. (2020). University entrepreneurial push strategy and students' entrepreneurial intention. *International Journal of Entrepreneurial Behavior & Research*, 26(2), 307–325. <https://doi.org/10.1108/IJEER-10-2018-0648>
- Zarefard, M., & Beri, S. E. C. (2018). Entrepreneurs' managerial competencies and innovative start-up intentions in university students: Focus on mediating factors. *International Journal of Entrepreneurship*, 2(2), 2–22.
- Zhao, H., Seibert, S. E., & Hills, G. H. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of Applied Psychology*, 90, 1265–1272. <https://doi.org/10.1037/0021-9010.90.6.1265>

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