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Impact of entrepreneurs' prior experience on their new ventures' early-stage performance: the mediation effect of entrepreneurial mindset level

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Introduction: Does an entrepreneur's prior experience affect the early-stage performance of new ventures? This study further explores the mediating effect of the entrepreneurial mindset, indicated by the quality of business plans, between entrepreneurs' prior experience and the early-stage performance of their new ventures.

Methods: The sample consists of 157 valid formal business plan documents from the "2021 Gusu Science and Technology Angel Program." The study employs an evaluation system developed to measure the quality of these business plans and assess the entrepreneurial mindset levels.

Results: The results reveal the mechanism through which prior experience influences early-stage performance. It indicates that entrepreneurs aiming for high long-term new venture performance should focus on learning and acquiring diverse experiences.

Discussion: The opportunity to write and evaluate their business plans can serve as a self-assessment tool for their entrepreneurial mindset using the evaluation system developed in this study. This approach can significantly enhance their performance and contribute to entrepreneurial success. Moreover, by employing this evaluation system, educators and educational institutions can better understand the entrepreneurial mindset levels of trainees (entrepreneurs) and tailor their courses more effectively.

KEYWORDS

entrepreneurs' prior experience, entrepreneurial mindset level, new venture, early stage performance, business plan

1 Introduction

It has been widely acknowledged that entrepreneurs tap into the knowledge, experience, and skills gleaned from their prior ventures to formulate and execute their plans in new ventures (Cooper et al., 1994; Unger et al., 2011). In the context of a VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) world and the ongoing digital revolution, conducting business is becoming increasingly complex because entrepreneurship embodies a journey filled with dynamic fluctuations. However, entrepreneurs' personal attitudes, such as demographic characteristics, cognitive ability, behavior, and educational background, are also vital for their management decisions,

thereby influencing their firm performance (He et al., 2019; Joseph et al., 2022). Recently, the ability to predict which firms will succeed has become essential for investors and researchers seeking to characterize what makes a successful entrepreneur (McKenzie and Sansone, 2019). The rapid development of technologies has accelerated disruption, innovation, and the implementation of business models (Nowiński and Kozma, 2017; Soltanifar et al., 2021).

Since the 1990s, the process-oriented view of entrepreneurship has focused on understanding entrepreneurship as a continuous learning process. This perspective does not regard entrepreneurship as a stable trait or characteristic, but rather as an ability that is gradually built up over time during the professional lives of enterprising individuals (Politis, 2005). Donbesuur et al. (2020) and Lamont (1972) suggests that entrepreneurs' prior experiences play a critical role in corporate performance. Among other things, the shift in focus highlights the role of entrepreneurs' prior experiences in developing their ability to handle the entrepreneurial process from opportunity recognition to exploitation (Politis, 2008). Specifically, an emerging area of research in strategic management emphasizes the role of business planning, which describes the current state and presupposed future of an organization. It can be considered one of the most widely recognized indications of embedding entrepreneurs' prior experience in start-up planning and managing a new venture (Botella-Carrubi et al., 2024; Honig and Karlsson, 2004).

Skills, preferences, and attitudes shape the entrepreneurial mindset, that enables entrepreneurs to navigate novel and ambiguous business concepts during the creation of new ventures, fostering sustainable growth for their enterprises (Oyeyemi et al., 2024). Business plans are considered highly practical tools that force entrepreneurs to transform their entrepreneurial mindsets into structured documents (Ferreras-Garcia et al., 2019; Kraus and Schwarz, 2007). Moreover, the positive effect of an entrepreneurial mindset (business plan quality) on new venture survival and growth has been confirmed (Lussier and Pfeifer, 2001; Lussier and Halabi, 2010). Nevertheless, the impact of entrepreneurs' prior experiences on their entrepreneurial mindset (indicated by their business plan quality) and, thus, the early-stage performance of their new ventures remain unknown, although entrepreneurs typically convert their prior experience into specific plans and actions for their new ventures.

Therefore, this study explored this mechanism, with the aims to investigate the mechanisms underlying entrepreneurial cognition, with a particular emphasis on entrepreneur's cognition reflected by their business plan. It seeks to update existing findings regarding the influence of entrepreneurs' past experiences on the early performance of new ventures and to integrate these insights into the framework of business plan cognition. Ultimately, the goal is to contribute new empirical insights to the field. Hence. based on a sample of 157 entrepreneurs' business plans and new ventures from the "2021 Gusu Science and Technology Angel Program" in China, we discover that in addition to the direct effect of the entrepreneurs' prior experiences (including formal education background, entrepreneurial experience, managerial experience, and industrial experience) on their new ventures' performance, their entrepreneurial mindset level (indicated by their business plan quality) plays a significant mediating role.

This study seeks to address an important and unresolved issue in the entrepreneurial literature by exploring entrepreneurs' cognition reflected in their business plans as an intermediary process and mechanism that explains the relationship between their prior experience and entrepreneurial performance, highlighting two key implications: first, it reveals how an entrepreneurial mindset, shaped by prior experience, significantly influences the early-stage performance of new ventures by transforming those experiences into actionable plans; second, it suggests a potential approach for assessing entrepreneurial mindset levels through the measurement of formal business plan quality.

2 Theoretical background and hypothesis development

Jemal (2020) argue that the notion of "potential opportunities" and the fit between this and entrepreneurs' mindset facets are pivotal to the identification of profitable markets and affects positively and significantly the performance of new ventures. Baron (2006) holds that the entrepreneurial social cognitive perspective can explain why certain entrepreneurs, but not others, recognize profitable opportunities. Social cognitive theory can be used to investigate how perceived opportunities are determined by key factors, including knowledge of the market and the entrepreneurs' alertness (Chen and Pan, 2019; Donbesuur et al., 2020). Kimjeon and Davidsson (2022) propose that entrepreneurs can cultivate a unique cognitive framework that enhances their ability to identify viable entrepreneurial opportunities by leveraging various resources, prior knowledge, and sustained alertness. The identification of such opportunities, both before and after launching a new venture, is critical to entrepreneurial success when combined with the actions the entrepreneur takes in response to these perceptions. Existing studies have largely focused on identifying new entrepreneurial business ventures and how they can be turned into profit-making opportunities (Mitchell et al., 2007). However, it remains unknown how entrepreneurs' prior experiences, including relevant knowledge and skills, facilitate their planning and actions before and after launching new ventures.

Based on MacMillan et al. (1986) and Power and Lundmark (2004), most scholars argue that entrepreneurs' prior experience is internalized by potential knowledge and skills accumulated via education, entrepreneurship, work, and industrial experience (Dimov, 2010; Toft-Kehler et al., 2014). Several studies, including those by Baron and Ensley (2006), Gompers et al. (2006), and Bignotti and Le Roux (2020) have focused on the performance of new ventures and suggested that the financial success of such ventures relies partly on the application of the skills, knowledge, and expertise acquired from previous business experience. According to Delmar and Shane (2004) and Toft-Kehler et al. (2014), prior experience can predict new venture performance. Eesley and Roberts (2012) claim that entrepreneurs develop expertise incrementally with each business venture, arguing that this represents a mechanism that leads to subsequent performance improvement. However, the empirical evidence is inconclusive. For example, Dencker et al. (2009) and Oe and Mitsuhashi (2013) find no effects; Delmar and Shane (2004) and Eesley and Roberts (2012) report non-linear effects, whereas Alsos and Carter (2006)

and Tornikoski and Newbert (2007) identify a negative effect. Given these inconsistent findings, we argue that the relationship between entrepreneurs' prior experience and the performance of new ventures at an early stage may be indirect.

2.1 Business planning and new venture performance

Hopp et al. (2018) argue that writing a business plan involves collecting and analyzing relevant information about the business sector as well as identifying risks and opportunities, which in turn enables the entrepreneur to develop viable contingent plans for future actions. In the business planning literature, some studies (e.g., Gruber, 2007; Welter et al., 2021; Schwenk and Shrader, 1993) have focused on the effect of business planning on the performance of new ventures. Honig and Karlsson (2004) definition of a business plan describes the current state and presupposed future of an organization, while recently George et al. (2019) and Mtau and Rahul (2024) reveal that formal plans can improve performance when aligned with organizational goals, as this alignment ensures that performance measurements are directly linked to the organization's mission and vision, thus promoting consistency in decision making and resource allocation.

Moreover, several scholars (e.g., Hechavarría et al., 2017; McCann and Vroom, 2015) suggest that business plans can help entrepreneurs address further problems and that a structured business plan can facilitate higher financial performance. Although one meta-analysis presents evidence of the positive but small impact of business planning on performance (Brinckmann et al., 2010), scholars tend to question the theoretical premise of the efficacy of business plans for higher business performance.

Business planning may help entrepreneurs make decisions and turn abstract goals into actions, reducing risk diffusion and accelerating product development (Delmar and Shane, 2003). Specifically, entrepreneurs who develop their business plans at an early stage may help reduce the impact of environmental uncertainty, send a message of legitimacy to investors, and provide effective guidance for subsequent entrepreneurial activities (Ansoff, 1991; Liao and Gartner, 2009). Essentially, the process of creating a new venture and developing a plan in written form can encourage entrepreneurs to learn and think because entrepreneurial planning and learning coexist, and the adaptive nature of entrepreneurial planning is the dynamic process of entrepreneurial learning. Thus, a business plan can substantially indicate the learning outcome, namely, the status quo of the entrepreneurial mindset of an entrepreneur for their business (e.g., Mansoori and Lackéus, 2020; Wei et al., 2018). Entrepreneurial success is multifaceted (Wach et al., 2016) and is based on the process of achieving valued outcomes (Alstete, 2008; Dej, 2010; Kurczewska et al., 2020). Hence, an entrepreneurial mindset, indicated by a business plan's quality, can affect and improve a new venture's income and shorten the time between its launch and attaining its first income.

Therefore, we hypothesize:

H1: The entrepreneurial mindset (indicated by business plan quality) significantly impacts new venture performance at an early stage.

H1a: The entrepreneurial mindset (indicated by business plan quality) significantly impacts new venture performance at an early stage, such that the better the entrepreneurial mindset, the higher the income of the new venture.

H1b: The entrepreneurial mindset (indicated by business plan quality) significantly impacts new venture performance at an early stage, such that the better the entrepreneurial mindset, the shorter the time before the new venture's first income.

2.2 Role of entrepreneurs' prior experience

Generally, the more relevant the knowledge entrepreneurs have, the more chances they have to successfully complete the entrepreneurial process. According to Baron (2006), entrepreneurship is the process of identifying, acquiring, and accumulating resources to seize perceived opportunities. Stuart and Abetti (1990), Quan (2012), Li and Dutta (2018) as well as Moritz et al. (2022) highlight the various factors that influence each entrepreneur's or entrepreneurial team's experience and expertise, including the number of new ventures they previously founded and the managerial roles they played within those ventures, as well as other aspects such as age, education, years of business, and technical experience. Haber and Reichel (2007) argue that the entrepreneurial process begins with an idea and business concept, followed by the accumulation of resources, the establishment of the venture, and finally its operation.

Prior research indicates that entrepreneurs' prior experience in business growth comprises four dimensions: industrial, entrepreneurial, managerial, and education (Blackwood and Mowl, 2000; Deakins and Freel, 1998; Soriano and Castrogiovanni, 2012; Toft-Kehler et al., 2014). Industrial experience can largely help the entrepreneur predict trends in the business environment and relevant technologies (Kor et al., 2007); entrepreneurial experience can empower the entrepreneur to transform opportunity identification into substantial actions (Ucbasaran et al., 2003); managerial experience can facilitate addressing the internal and external challenges of business management (Balsmeier and Czarnitzki, 2014); and education can provide a broader horizon for the entrepreneur to develop strategies and plans (Halberstadt et al., 2019).

Although entrepreneurs' prior experience has often been considered a critical factor in predicting venture success, research has yielded mixed findings. Kim et al. (2023) and Toft-Kehler et al. (2014) argued that these mixed findings were due to a lack of attention paid to how experience influences performance. Typically, entrepreneurs use their acquired prior experience to perceive connections between seemingly unrelated events or trends in markets and thus identify opportunities (Baron, 2006). Experienced entrepreneurs are likely to develop a substantial reservoir of knowledge to draw on, which provides them with hints and clues of greater quality and quantity for their decisions (Yang and Hahn, 2015). This allows them to pursue more feasible and desirable ideas and, thus, potentially better business performance (Baron and Ensley, 2006; Hmieleski and Baron, 2009). Hence, intermediate processes and mechanisms exist between prior experience and entrepreneurial success (Unger et al., 2011).

For instance, experienced entrepreneurs identify opportunities more effectively than nascent entrepreneurs, as they use intuition and conduct in-depth analyses based on their experience and knowledge to avoid intuitive misleading judgments (Baldacchino et al., 2015; Chen and Pan, 2019).

Moreover, the response to uncertainties related to opportunities, as well as the expectation of costs and benefits, concurrently drives entrepreneurs to make business plans (Bhide, 2003). The improvement of business plan quality with the continuous growth of experience is essentially a learning process for entrepreneurs (Brinckmann and Kim, 2015). The knowledge and skills obtained during this process can help entrepreneurs better interpret the opportunities around them, thus affecting their entrepreneurial mindsets (Shane, 2000). Entrepreneurs' systematic mindsets regarding new opportunities and subsequent activities can be explicitly indicated by the quality of their business plans (Brinckmann et al., 2010; Burke et al., 2010; Schenkel and Garrison, 2009).

Therefore, we hypothesize:

H2: Entrepreneurs' prior experience significantly impacts their entrepreneurial mindset (as indicated by their business plan quality).

H2a: Entrepreneurs' industrial experience significantly impacts their entrepreneurial mindset (as indicated by their business plan quality).

H2b: Entrepreneurs' managerial experience significantly impacts their entrepreneurial mindset (as indicated by business plan quality).

H2c: Entrepreneurs' entrepreneurial experience significantly impact their entrepreneurial mindset (as indicated by business plan quality).

H2d: Entrepreneurs' educational backgrounds significantly impacts their entrepreneurial mindsets (as indicated by their business plan quality).

The venturing process is an entrepreneurial learning process that involves a transformation process that is effective in recognizing and acting on entrepreneurial opportunities and coping with the liabilities of newness (Smith and De Silva, 2022). Gustafsson (2009) and Zollo et al. (2021) indicate that if entrepreneurs have both linear and nonlinear thinking focuses, they tend to make rational decisions in highly dynamic and uncertain entrepreneurial situations.

Jones and Butler (1992) conclude that entrepreneurs' experiences of uncertainty may result in short-term rewards, allowing them to achieve higher performance. Entrepreneurs typically use their acquired cognitive frameworks and experiences to identify opportunities and perceive connections between seemingly unrelated events or market trends (Baron, 2006). Thus, an entrepreneurial mindset developed from prior experience can substantially empower the performance of new ventures, influencing both their initial revenue and sustainability. In this case, their mindset can be a critical mediator between their knowledge base (stemming from their prior experience and educational level) and their new venture's performance. Hence, intermediate processes and mechanisms exist between prior experience and entrepreneurial success, which must be explored (Unger et al., 2011).

Therefore, we hypothesize:

H3: The entrepreneurial mindset (indicated by business plan quality) mediates the significant relationship between entrepreneurs' prior experience and new venture performance at an early stage.

H3a: The entrepreneurial mindset (indicated by business plan quality) mediates the significant relationship between industrial experience and new venture income.

H3b: The entrepreneurial mindset (indicated by business plan quality) mediates the significant relationship between managerial experience and new venture income.

H3c: The entrepreneurial mindset (indicated by business plan quality) mediates the significant relationship between entrepreneurial experience and new venture income.

H3d: The entrepreneurial mindset (indicated by business plan quality) mediates the significant relationship between educational background and new venture income.

H3e: The entrepreneurial mindset (indicated by business plan quality) mediates the significant relationship between industrial experience and time before the new venture's first income.

H3f: The entrepreneurial mindset (indicated by business plan quality) mediates the significant relationship between managerial experience and time before the new venture's first income.

H3g: The entrepreneurial mindset (indicated by business plan quality) mediates the significant relationship between entrepreneurial experience and the length of time before the new venture's first income.

H3h: The entrepreneurial mindset (indicated by business plan quality) mediates the significant relationship between educational background and the length of time before the new venture's first income. The conceptual model of this article is illustrated in Figure 1.

3 Data and measures

3.1 Participants

The data were collected from the applications for Suzhou's "2021 Gusu Science and Technology Angel Program," which is driven by social honors and policy grants and has a competitive nature. Our research focused on the business plans of Chinese technological entrepreneurs. Our sample consisted of new technological ventures in Suzhou. Suzhou has become a hub of commerce and entrepreneurship in Southeastern China, where an inclusive business culture has been nurtured that strongly supports start-ups (Hemmert et al., 2019). Valid samples were selected based on two key criteria: first, new ventures were founded for no <42 months, and second, new ventures generated patents (including patents in the application process). This research was supported by the Suzhou Science and Technology Bureau, which provided the data and required all applicants to submit business plans that followed the same proposed format, allowing for the viability of this study.

We randomly selected 160 applications (business plans) from the "2021 Gusu Science and Technology Angel Program." Of these, 157 met the quality criteria as detailed and formal written

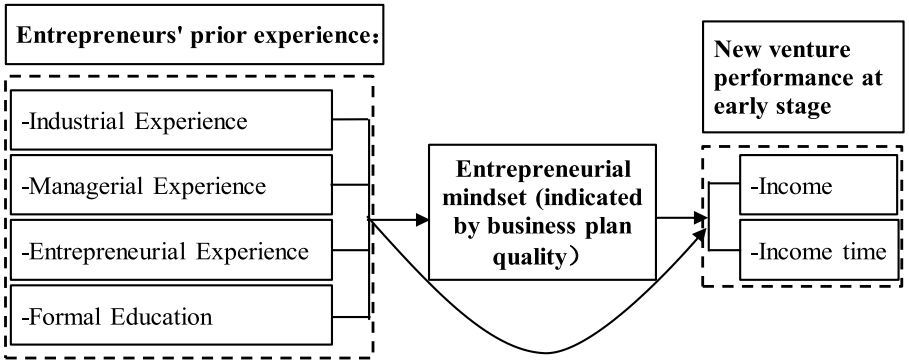

FIGURE 1
The full conceptual framework of the relationship between the entrepreneurs' prior experience and new venture performance at early stage, mediated by entrepreneurial mindset level (indicated by business plan quality).

plans. These plans ranged from 3,163 to 14,206 words and included the main project information about societal, industrial, and technological backgrounds; project purpose and meaning; product technological features and their key innovation indicators; economic and social benefits; market, promotional, pricing, and competition strategies; risks and corresponding countermeasures; financial goals and the financial situation; further growth and development plans; and expected business operations over the following 3 years. Overall, the plans covered several high-tech industries, such as new energy, biomedicine, new materials, intelligent manufacturing, and big data.

3.2 Measures

The measures used for the variables in this study are listed below:

3.2.1 Entrepreneurs' prior experience

Prior experience was measured using four variables consistent with those used in the studies discussed in the literature review. Because the subjects of our research were technical entrepreneurs, we believe that their academic degrees are an important part of their prior experience in the analysis. The participants were asked to indicate their answers to the following questions:

Industrial experience refers to whether entrepreneurs have industrial research or management experience before beginning a new business: no (coded as 0) or supported (coded as 1).

Managerial experience refers to whether the entrepreneurs had management experience before beginning a new business: no managerial experience (coded as 0), managerial experience below the department manager level (coded as 1), experience as a department manager (coded as 2), director (coded as 3), or senior executive, that is, vice president or above (coded as 4).

Entrepreneurial experience refers to whether entrepreneurs are nascent (coded as 0) or serial (coded as 1).

Formal education refers to an educational background. Considering technological entrepreneurs as our sample, we divided their educational background into doctoral degree (coded as 2) and master's degree or lower (coded as 1).

3.2.2 Entrepreneurial mindset (indicated by their business plan quality)

There is no existing scale for measuring entrepreneurial mindset levels (or business plan quality). Based on Timmons' (1999) model of the entrepreneurial process and the further exploration of entrepreneurial models by Bruyat and Julien (2001) and Shane (2003), we developed the measurement scale presented in Table 1. We adopted five primary dimensions and 15 secondary indicators. The average value was used to represent the mindset level (indicated by business plan quality). The 4-point Likert scale was used to evaluate each item.

3.2.3 Business performance

Unger et al. (2011) regard profitability, growth, and size as criteria for assessing entrepreneurial success. As it is difficult for start-ups to make a profit in a short period, we focus on two dependent variables: income (if no income, coded as 0; otherwise, coded as 1) and the length of time before the first income was generated (0–6 months, coded as 1; 7–12 months, coded as 2; and 13–18 months, coded as 3).

The demographics of those technological entrepreneurs are presented in Table 2.

3.3 Procedures for data analysis

We invited four specialists (with rich entrepreneurial knowledge and a minimum of 3 years of corporate counseling and consulting experience) to independently grade three identical samples. The results indicated a high degree of consistency, and the grading experience was discussed and reviewed. They graded the same six samples individually, and the results were highly consistent. The remaining 148 samples were evenly distributed among the specialists. Four members completed sample allocation and grading. Finally, the data were summarized, and further

TABLE 1 Establishment and interpretation of the business plan evaluation index system.

Primary grade index	Secondary grade index	Criteria
Trend chance awareness	Trend opportunity	Understanding of the categories of technology/society/policy/industry/business development with respect to the trend and opportunity (relevance and specific degree):
		0 point: none indicated or irrelevant;1 point: relevant but broad;2 points: relevant and relatively specific; and 3 points: closely associated and concrete. If the project only covers a subdivision of the opportunities described and doesn't make a statement, it is considered to be broad. If the range of trends presented by the entrepreneur is coincident with the specific industry or market of the entrepreneurship program, the program is considered to be closely associated and concrete.
	Trend sense	Understanding of the level of problems faced with technology/society/policy/industry/business trends (concreteness and importance):
		0 point: none indicated or broad; 1 point: concrete problems; 2 points: concrete and major current problems; and 3 points: concrete, major and urgent problems. If the problems pertain to important issues of consensus in the field, they are considered to be current, and if the problems relate to urgent issues of consensus in the field, they are considered to be urgent.
	Project position	Understanding of innovation trends in technological innovation:
		0 point: none comparison; 1 point: various technological programme options involved, but cannot be judged as the mainstream trend or unique advantages; 2 points: mainstream programme or with unique advantages; 3 points: mainstream programme as well as cutting-edge technology innovation. If the technology line is in a relatively high degree of consensus, it is considered to be mainstream. Uniqueness refers to the adoption of new technology line/workmanship, but cannot be judged as basic consensus of future world-beaters. If the technology line/workmanship is in basic consensus of future world-beaters, it is considered cutting-edge.
Market chance awareness	Customers' requirements	Cognitive depth to specific target customers and their dissatisfaction on current programs:
		0 point: no specific customers present or no point of dissatisfaction; 1 point: broad or qualitatively inclined presentation; 2 points: quantitative inclined presentation; and 3 points: quantitative presentation. Broadness or qualitatively inclined presentation refers to intuitive judgement. Quantitative presentation refers to the presentation of concrete parameters for customers' dissatisfaction with current programs.
	Alternative advantage	Understanding of the competition for target customer's needs:
		0 point: none indicated or irrelevant; 1 point: customers have multiple alternatives at the same time; 2 points: customers have few alternatives; 3 points: unique alternative is available. Multiple alternatives mean that customers can select products that are both overseas and domestic., Few alternatives mean products originate from abroad, and only a few companies are able to provide similar products. Uniqueness means technology and cost is advanced in both overseas and domestic market.
	Transaction willingness	Understanding of customers' transaction willingness with the new products:
		0 point: none indicated or unable to judge; 1 point: current willingness; 2 points: relatively intense willingness; and 3 points: intense or certain transaction willingness. Intensity refers to an accessible contract that is related to a large amount or multi-client trading transactions or further commercial contract intention on joint development or affirmation of trial results, but not strategic cooperation or purchase intention.
Business chance awareness	Model of closed-loop	Understanding of the business model and the value access method for the project:
		0 point: none indicated or cannot be closed-loop; 1 point: elementary closed-loop; 2 points: elementary closed-loop with a matched balance of payment analysis; and 3 points: with further analysis of the source of profit. If key points of value output, transmission, or access are provided without apparent fracture or subjective imagination that lacks factual basis and participant information is essentially complete, it is considered closed-loop. Balance of payment analysis is based on financial figures on account of facts or planned matched information, but not subjective inclined financial figures. The source of profit explains how the model earns a profit.
Business chance awareness	Innovation performance	Understanding of the relationship between pricing strategy and enterprise performance brought about technological innovation:
		0 point: none indicated or cannot be perceived; 1 point: common; 2 points: relatively intense willingness; and 3 points: intense willingness. Common present as although innovation brings a high-level product or price advantage with low cost, a data basis for competition advantages cannot be provided. If a competitive advantages basis is provided under variation or mixed strategies brought about by innovation, considered as relatively intense. Furthermore, intense willingness is based on relatively intense willingness and provides evidence of significantly higher gross margins than competitors.
	Model of tension	The project model has reproducible characteristics driven by investment. Or, the project is extensible in new business area with advanced technology and provide a market entry strategy:
		0 point: none indicated; 1 point: market entry strategy provided/ no tension or extensibility; 2 points: market entry strategy provided/ with tension or extensibility; 3 points: intense tension or extensibility. Intensity refers to the commercial value expectation of the project or investment willingness for the accelerated expansion of business models with current or complete venture capital.

(Continued)

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TABLE 1 (Continued)

Primary grade index	Secondary grade index	Criteria
Team matching awareness	Technological personnel	Experience of project team members in research and development on technology and application areas necessary to start up a business:
		0 point: no experience; 1 point: research or technology innovation experience present; 2 points: long-term research or technology innovation experience present; and 3 points: long-term and cutting-edge research or technology innovation experience present. If the duration is more than 5 years or the research result is prominent, it is considered long-term.
	Market personnel	Experience of the project team members in market development or resources in direct customers/ channel resources:
		0 point: neither item (resources or experience) present; 1 point: possession of experience and resources; 2 points: their rich experience or rich resources present; and 3 points: rich experience and rich resources present. Rich experience usually means the time of work experience is more than 5 years or outstanding achievement was once produced. Rich resources refer to not only direct income but also the guarantee of continued company existence or rapid business increase.
	Management personnel	Project founders or partners have abundant operation experience in similar enterprises or bring in industry cooperation resources:
		0 point: neither item (experience or resource) present; 1 point: possession of experience and resources; 2 points: either rich experience or rich resource present; 3 points: rich in experience and resources present. Rich experience usually means that the duration of work as a senior executive exceed 5 years or the identity of successful habitual entrepreneurs. Industry cooperation resources refers to the relationship network (*guanxi*) that has good history relationship and helps the project enter industry cooperation more rapidly.
Resource matching awareness	Technological resources	The project has close resource parties from scientific research or industry for technological innovation or application of research and development:
		0 point: neither items involved; 1 point: one or both items involved; 2 points: excellent in one item; 3 points: excellent in both items. Excellence means the research institutions, universities or head companies related are well known in the technology area. Close cooperation refers to contractual relationship of research and development cooperation.
	Financial resources	The project obtains funding guarantee for continuous development from internal or external stakeholders:
		0 point: cannot start or develop without financing; 1 point: tight budget, in need of urgent financing to guarantee product research development, supply and market expansion; 2 points: guarantee of early supply or no urgency in short time financing; and 3 points: fund available for entry into the market or continuous development of the market (no less than 5 months in prospect). The company doesn't bother with urgent financing or has completed financing arrangements for venture capital or has made relevant plans. Short times refers to a period of less than 5 months.
	Marketing resources	The cooperation resources of the project provide important brands and channels for rapid entry into the market or market expansion:
		0 point: neither item involved; 1 point: one or both items involved; 2 points: excellent in one item; and 3 points: excellent in both items. Excellence means related brands help distinctly for establishing of customer credit or direct offer of quality channel cooperation. Cooperation means marketing support of industry investment shareholders or contractual relationship in marketing.

statistical analyses were conducted using SPSS 25, AMOS 24, and Mplus 7.

4 Analysis and results

4.1 Scale reliability and validity

Our novelty measures of entrepreneurial mindset demonstrated internal consistency (reliability) with Cronbach's α values between 0.763 and 0.860 (for each subdimension: trend chance awareness: 0.860; market chance awareness: 0.799; business chance awareness: 0.778; team matching awareness: 0.787; resources matching awareness: 0.781). Given that our research adopted the 4-point Likert scale to measure the variables, Cronbach's α values are all above 0.7, which is an acceptable level of reliability to indicate high reliability (Hair et al., 2010). Therefore, we used KMO and Bartlett's tests to check the entrepreneurial mindset variable ratios for the analysis, and the results were positive for data analysis (Kaiser–Meyer–Olkin Measure of Sampling Adequacy = 0.979; Approx. Chi-squared = 2,009.346; df = 105.000; p = 0.000) as shown in Table 3.

Moreover, to reduce the number of variables needed to explain and interpret the results, we further adopted an exploratory factor analysis (EFA) for our entrepreneurial mindset variable to discover the factor structure of the measure and to examine its internal reliability. The results indicated that there were five factors with eigenvalues >1, and the total explained variance was 72.527%. Furthermore, the scree plot (Figure 2) tended to be flat starting from the sixth factor, indicating that five factors (6–1 = 5) should be extracted. After extracting the five measurement factors, the maximum variance method was used for the rotation (Table 4). The results showed that the entrepreneurs' mindset level (business plan quality) measure scale, which was used in this study, had good structural validity.

TABLE 2 Demographic profile of entrepreneurs.

Item	Category	Frequency	%
Formal education background	PhD	65	41%
	Master degree or below	92	59%
Entrepreneurial experience	first-time entrepreneurs	143	91%
	Serial entrepreneurs	14	9%
Industrial experience	Yes	91	58%
	No	66	42%
Management experience	Without	64	41%
	Below department manager	28	18%
	Department manager	21	13%
	Director	11	7%
	Senior executive (vice president or above)	33	21%
Income	Yes	36	23%
	No	121	77%
Income time	0–6 month	9	6%
	7–12 month	8	5%
	13–18 month	2	1%
	Others	138	88%
N=157			

4.2 Confirmatory factor analysis

Furthermore, confirmatory factor analysis (CFA) was conducted to assess the reliability and validity of the measurement model for the entrepreneurial mindset variable. To do so, according to Ho's (2006) recommendations, scale fit indices and factor loadings must be checked. Incremental, absolute, and badness-of-fit indices were used. The result indicated that $\chi^2 = 103.959$, df = 80,χ^2/df = 1.299, $p < 0.001$, GFI = 0.957, AGFI = 0.936, CFI = 0, 0.998, RFI = 0.933, TLI = 0.988, NFI = 0.949, and RESMA = 0.031. We further examined the factor loading of each item, and the results are shown in Table 5, demonstrating that each load was between 0.651 and 0.847, reaching the significance level (P <0.001). The CR values for each dimension ranged from 0.784 to 0.861, all of which exceeded 0.7. The AVE values ranged from 0.549 to 0.675, all of which exceeded 0.5. Therefore, all indicators meet the corresponding standards, and the convergent validity of the measurement dimension was acceptable.

Based on the first-order confirmatory factor analysis, the second-order confirmatory factor analysis test showed that the second-order confirmatory factor analysis model $\chi^2 = 105.431$, DF = 85, χ^2/DF = 1.240, RMSEA = 0.028, GFI = 0.957, AGFI = 0.939, RFI = 0.936, NFI = 0.949, IFI = 0.990, TLI = 0.987, CFI = 0.989, which is shown in Figure 3. Therefore, it also has a good model fit, indicating that latent variable analysis can be used later or that first-order variables can be packaged.

4.3 Correlation analysis

Descriptive statistics and correlations for the study variables are shown in Table 6. We calculated the average score of the dimension items of the business plan cognitive level and implemented descriptive statistics and correlation analysis for each dimension variable. The results show that a significant positive correlation existed between the sub-dimensions of the business plan (PS < 0.05), with a correlation coefficient between 0.404 and 0.464. A significant positive correlation was also observed between the sub-dimensions and the entire business plan (PS <0.05), with correlation coefficients between 0.693 and 0.774.

4.4 Structural equation model and mediation effect testing

Furthermore, we used Mplus 7 to establish a structural equation model with industrial experience, managerial experience, entrepreneurial experience, and educational background as mediating variables; entrepreneurial mindset (business plan quality) as mediating variables; and income and income time as dependent variables. As Kishton and Widaman (1994) and Yang and Hahn (2015) suggested, all five sub-benchmarks were subject-packed to reduce the difficulty in estimating the model. In addition, because the affected variables of dichotomies were involved in the model, the weighted least squares with mean and variance method was used for robust estimation. The result is

TABLE 3 Total variance explained.

Total variance explained											
Component			Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
			Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
Mediating variable	Trend chance awareness	1	5.924	39.487	39.497	5.924	39.497	39.497	2.135	15.423	15.423
		2	1.326	8.843	48.339	1.326	8.843	48.339	2.206	14.706	30.138
		3	1.224	8.162	56.501	1.224	8.162	56.501	2.151	14.338	44.476
	Market chance awareness	1	1.205	8.033	64.534	1.205	8.033	64.534	2.116	14.105	58.581
		2	1.199	7.993	72.527	1.199	7.993	72.527	2.092	13.946	72.527
		3	0.609	4.062	76.589						
	Business chance awareness	1	0.154	3.427	80.016						
		2	0.511	3.408	83.424						
		3	0.435	2.899	86.323						
	Team matching awareness	1	0.399	2.658	88.982						
		2	0.386	2.575	91.557						
		3	0.365	2.430	93.988						
	Resource matching awareness	1	0.341	2.270	96.258						
		2	0.310	2.065	98.323						
		3	0.252	1.677	100.000						

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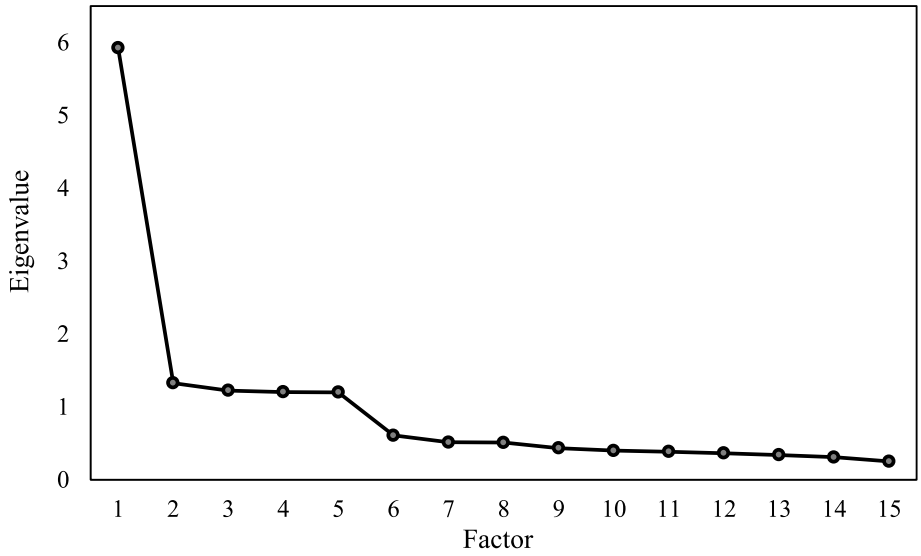

FIGURE 2
Scree plot.

TABLE 4 Rotated component matrix.

Measure	Component				
	1	2	3	4	5
Trend opportunity	0.792	0.152	0.191	0.192	0.218
Trend sense	0.815	0.214	0.121	0.127	0.170
Project position	0.838	0.131	0.219	0.192	0.111
Customers' requirements	0.145	0.768	0.258	0.124	0.187
Alternative advantage	0.151	0.801	0.124	0.187	0.122
Transaction willingness	0.165	0.783	0.070	0.183	0.091
Model of closed-loop	0.146	0.269	0.140	0.713	0.129
Innovation performance	0.166	0.132	0.093	0.779	0.168
Model of tension	0.155	0.120	0.194	0.823	0.103
Technological personnel	0.190	0.051	0.797	0.225	0.125
Market personnel	0.131	0.172	0.782	0.146	0.115
Management personnel	0.171	0.207	0.763	0.059	0.206
Technological resources	0.239	0.161	0.146	0.093	0.797
Financial resources	0.177	0.267	0.182	0.069	0.748
Marketing resources	0.069	0.009	0.123	0.247	0.789

shown in Figure 4, indicating that the model has a good fit (χ^2 = 27.170, df = 29, χ^2/df = 0.937, RMSEA = 0.000 (90%CI = [0.000, 0.040]), CFI = 1.000, TLI = 1.000, SRMR = 0.027).

Industrial experience has a significant positive effect on entrepreneurial mindset (B = 0.237, SE = 0.059, Z = 4.03, P < 0.001, β = 0.237), thus H2a is supported. Managerial experience has a significant positive effect on entrepreneurial mindset (B = 0.105, SE = 0.019, Z = 5.368, P < 0.001, β = 0.32), thus H2b is supported. Entrepreneurial experience has a significant positive effect on entrepreneurial mindset (B = 0.242, SE = 0.055, Z = 4.424, P < 0.001, β = 0.243), thus H2c is supported. Educational background has a significant positive influence on entrepreneurial mindset (B = 0.296, SE = 0.056, Z = 5.263, P < 0.001, β = 0.295), thus H2d is supported. Therefore, H2 was supported. Entrepreneurial mindset has a significant positive effect on income (B = 1.476, SE = 0.243, Z = 6.078, P < 0.001, β = 0.439), thus H1a is supported. Entrepreneurial mindset has a significant positive effect on income time (B = 0.723, SE = 0.123, Z = 5.887, P < 0.001, β = 0.363), thus H1b is supported. Accordingly, H1 is supported. Table 7 presents the results.

TABLE 5 Confirmatory factor analysis and convergence validity.

Benchmark	Items	Factor loading	SE	Z	p	Standardized factor loading	CR	AVE
Trend chance awareness	Trend opportunity	0.662	0.039	16.999	<0.001	0.830	0.861	0.675
	Trend sense	0.635	0.040	15.749	<0.001	0.786		
	Project position	0.716	0.041	17.504	<0.001	0.847		
Market chance awareness	Customers' requirements	0.628	0.041	15.496	<0.001	0.806	0.801	0.573
	Alternative advantage	0.639	0.044	14.629	<0.001	0.770		
	Transaction willingness	0.548	0.043	12.762	<0.001	0.691		
Business chance awareness	Model of closed-loop	0.523	0.040	13.126	<0.001	0.715	0.784	0.549
	Innovation performance	0.595	0.046	12.877	<0.001	0.704		
	Model of tension	0.628	0.042	15.070	<0.001	0.800		
Team matching awareness	Technological personnel	0.635	0.044	14.354	<0.001	0.765	0.789	0.554
	Market personnel	0.650	0.049	13.360	<0.001	0.723		
	Management personnel	0.605	0.044	13.886	<0.001	0.745		
Resource matching awareness	Technological resources	0.506	0.033	15.248	<0.001	0.806	0.784	0.550
	Financial resources	0.450	0.032	14.173	<0.001	0.759		
	Marketing resources	0.408	0.035	11.749	<0.001	0.651		

Finally, regarding the mediation effect of H3, according to Hayes (2009), the bootstrapping procedure in AMOS was adopted and performed with 5,000 resamples to analyze the confidence intervals (CIs) for each specific mediation path. The results indicated in Table 8 show that the 95% CI of each specific mediation path were all above zero, implying that the hypotheses for the mediating effects were supported.

5 Discussion and conclusion

This study highlights the mediating role of entrepreneurs' mindsets, specifically reflected in the quality of their business plans, and provides empirical evidence on how previous experiences influence new venture performance during early stages. The research was conducted using a sample of technical entrepreneurs participating in a formal business plan competition. Parameters such as industrial, managerial, and entrepreneurial experience were analyzed. The findings suggest that entrepreneurs' cognitive understanding of the role of business planning is strongly influenced by their prior experiences. This distinction in experience and business planning levels serves as a clear indicator of their capacity to achieve success.

As anticipated, the direct relationship between entrepreneurs' cognitive levels concerning business plans and early-stage venture performance (H2) was confirmed. The research validates that entrepreneurs with a higher cognitive awareness demonstrated enhanced creativity and the ability to clearly articulate and predict valuable entrepreneurial activities. This capability allows them to assemble teams with complementary skills and identify potential opportunities aligned with customer needs, ultimately improving venture performance (de Mol et al., 2015). Moreover, prior entrepreneurial experiences significantly contributed to their success, as predicted in H3, corroborating earlier studies (Lamont, 1972; Lee and Tsang, 2001; Stuart and Abetti, 1990). The results of H1 validate our measurement model, confirming that business plan quality is a strong predictor of early-stage new venture performance.

The theoretical framework built upon cognitive and entrepreneurial mindset theories reveals that prior experiences: whether entrepreneurial, industrial, managerial, or educational—positively influence an entrepreneur's cognitive level regarding business planning. This cognitive capacity, in turn, enhances early-stage venture performance and acts as a critical mediator. The study introduces a conceptual model linking prior experiences to both cognitive levels of business planning and early-stage venture performance, alongside a measurement model for cognitive level assessment. Based on these findings, we conclude that evaluating the quality of written business plans remains paramount, as it is a reliable predictors of entrepreneurial success across various contexts.

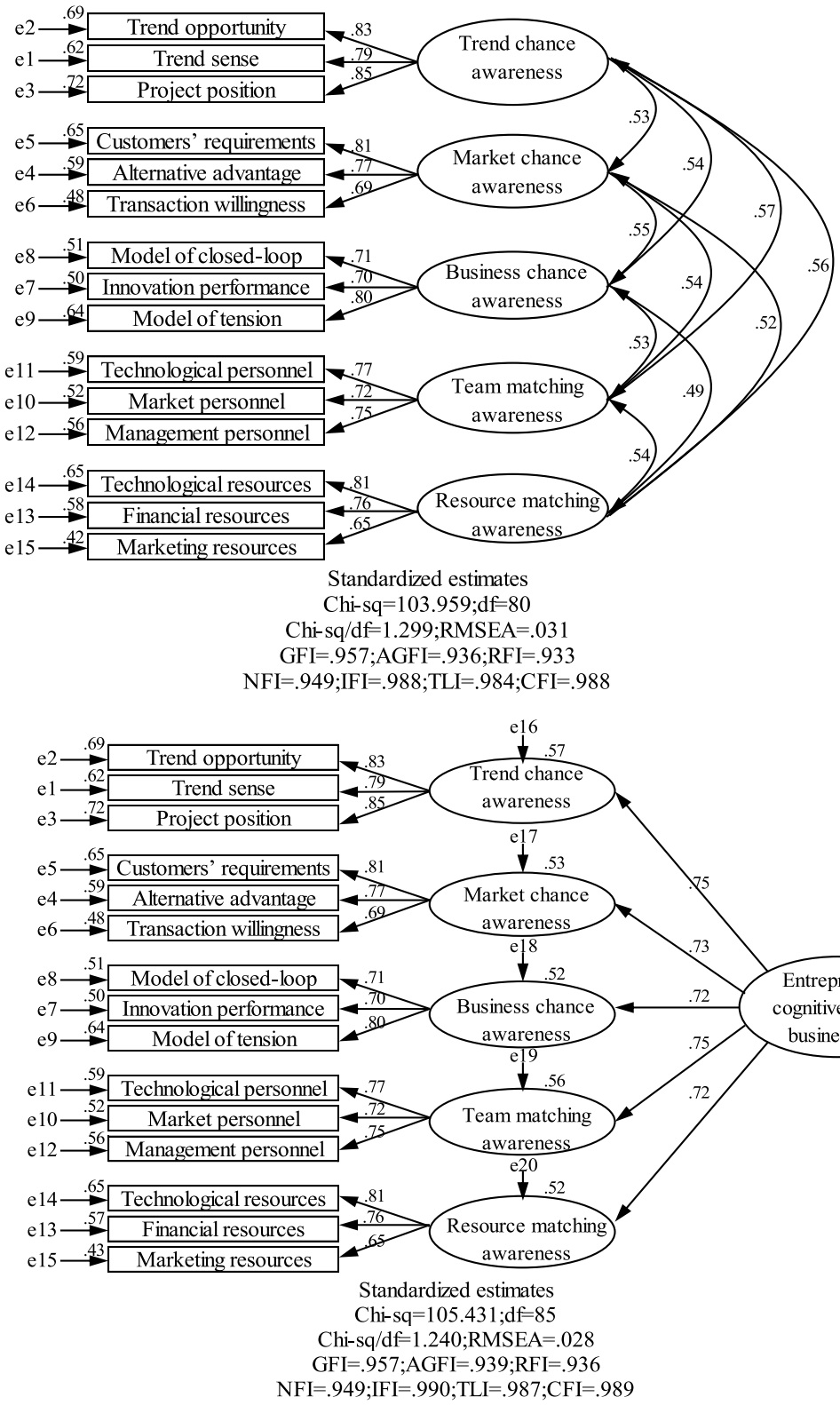

FIGURE 3
First order and second order confirmatory factor analysis.

TABLE 6 Descriptive statistics and correlations ($N = 157$).

	M	SD	1	2	3	4	5	6
1. Trend chance awareness	1.539	0.724	1.000					
2.Market chance awareness	1.517	0.678	0.446**	1.000				
3.Business chance awareness	1.452	0.658	0.451**	0.453**	1.000			
4.Team matching awareness	1.411	0.711	0.464**	0.420**	0.417**	1.000		
5.Resources matching awareness	2.039	0.514	0.453**	0.406**	0.404**	0.428**	1.000	
6.Entrepreneurs' mindset level (indicated by business plan quality)	1.592	0.487	0.774**	0.741**	0.737**	0.749**	0.693**	1.000

**Correlation is significant at the 0.01 level (2-tailed).

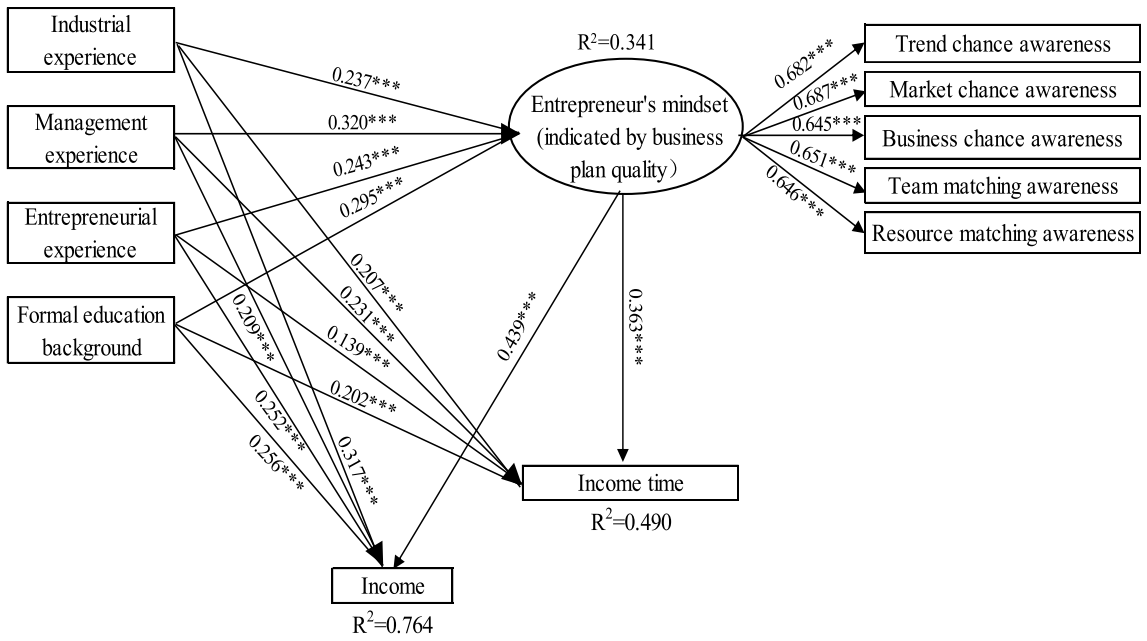

FIGURE 4
The structure equation model (standardized). ***Correlation is significant at the 0.001 level (2-tailed).

5.1 Theoretical implications

Our research has important theoretical implications for entrepreneurship studies. The findings align with the mainstream perspective that an entrepreneur's prior experience strongly influences early-stage new venture performance (Baron and Ensley, 2006; Politis, 2008; Shepherd et al., 2009; Toft-Kehler et al., 2014). Additionally, our study reveals that the cognitive level of an entrepreneur's business plan mediates the relationship between previous experience and early-stage venture performance. This is a significant finding, as it provides empirical support for prior research (Delmar and Shane, 2004; Eesley and Roberts, 2012) that suggests a non-linear relationship. Our research demonstrates that the cognitive level of business planning serves as a critical intermediate mechanism. The discrepancies in previous results regarding the impact of entrepreneurial experience on new venture performance may be attributed to the overlooked interaction effect of this experience (Van Gelderen et al., 2011).

Furthermore, by incorporating social cognitive theory, our study addresses a gap in understanding the pre-factors influencing business plan development. By integrating goal-setting theory into the analytical framework of entrepreneurs' cognitive levels,

TABLE 7 The path coefficient test.

Path			B	SE	Z	p	β	Hypothesis	Supported
Industrial experience	→	Entrepreneurs' mindset	0.237	0.059	4.03	<0.001	0.237	H2a	Yes
Management experience	→	Entrepreneurs' mindset	0.105	0.019	5.368	<0.001	0.32	H2b	Yes
Entrepreneurial experience	→	Entrepreneurs' mindset	0.242	0.055	4.424	<0.001	0.243	H2c	Yes
Formal education background	→	Entrepreneurs' mindset	0.296	0.056	5.263	<0.001	0.295	H2d	Yes
Entrepreneurs' mindset level	→	Income	1.476	0.243	6.078	<0.001	0.439	H1a	Yes
Entrepreneurs' mindset level	→	Income time	0.723	0.123	5.887	<0.001	0.363	H1b	Yes

B is non-standardized coefficient. β is standardized coefficient.

TABLE 8 Bootstrap test for mediation effect.

Path					Mediating effect	Bootstrap			Hypothesis	Supported
						SE	95%CI			
Industrial experience	→	Entrepreneurs' mindset level	→	Income	0.104	0.029	0.056	0.171	H3a	Yes
Management experience	→	Entrepreneurs' mindset level	→	Income	0.141	0.034	0.083	0.218	H3b	Yes
Entrepreneurial experience	→	Entrepreneurs' mindset level	→	Income	0.107	0.030	0.056	0.175	H3c	Yes
Formal education background	→	Entrepreneurs' mindset level	→	Income	0.130	0.033	0.076	0.208	H3d	Yes
Industrial experience	→	Entrepreneurs' mindset level	→	Income time	0.086	0.024	0.045	0.143	H3e	Yes
Management experience	→	Entrepreneurs' mindset level	→	Income time	0.116	0.026	0.072	0.177	H3f	Yes
Entrepreneurial experience	→	Entrepreneurs' mindset level	→	Income time	0.088	0.025	0.045	0.144	H3g	Yes
Formal education background	→	Entrepreneurs' mindset level	→	Income time	0.107	0.027	0.062	0.170	H3h	Yes

our research rectifies the shortcomings of prior studies that primarily focused on experience and opportunity recognition. Additionally, we propose an evaluation system to measure entrepreneurs' cognitive levels regarding business planning, which we believe will significantly influence future entrepreneurship research. Our findings suggest that while prior experience plays a role in venture performance, its explanatory power is limited without considering the mediating role of cognitive business planning.

These findings highlight the distinct advantages of experienced entrepreneurs and the complexities of the entrepreneurial process. We have filled a crucial research gap by empirically demonstrating that the cognitive level of business planning is the intermediary between prior experience and early-stage venture success. Beyond contributing to entrepreneurship theory and practice, we recommend using the 15 dimensions from our evaluation system for further entrepreneurship research to assess business planning levels, with room for further refinement.

5.2 Practical implications

Based on these findings, the research indicates that entrepreneurs seeking high levels of long-term new venture performance should engage in continuous learning and diverse experiences. This approach enhances their knowledge and equips them with essential resources and skills for entrepreneurial activities. By writing and evaluating their business plans, entrepreneurs can conduct a self-assessment of their entrepreneurial mindset using the developed evaluation system, significantly improving their performance and success.

Additionally, this evaluation system allows educators and training agencies to gain insights into the entrepreneurial mindset levels of their trainees, enabling them to customize courses and programs to better meet the needs of aspiring entrepreneurs. Targeted workshops can address key areas identified through evaluations, ensuring entrepreneurs are

well-prepared to navigate the complexities of the VUCA era. By fostering effective business planning and mindset development, we can create a stronger entrepreneurial ecosystem that supports sustainable growth and success in new ventures.

5.3 Limitations

Although this research provides better knowledge and understanding of the mediation effect of entrepreneurs' mindset level of business plan on the relationship between their previous experience and new venture performance at an early stage, it also has several limitations. Despite the high reliability and validity of the evaluation criterion of entrepreneurs' mindset level (business plan quality), the research may not capture all the capabilities and skills required to establish a new venture and needs further improvement. In addition, this study relied on evaluations by third-party experts; therefore, there is a chance that judgments will be influenced by personal bias (Langfeldt, 2004). Thus, we recommend that further studies test the hypothesized conceptual model using data from different regions. Another potential limitation of this study is related to the time span and measurement model that we used to measure new venture performance; therefore, further research is needed for future studies to replicate the findings of the study using longitudinal analysis. Finally, we recommend further research to improve our proposed conceptual model by including additional samples and controlled variables (e.g., geographic origins of entrepreneurs and family background).

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

SC: Data curation, Formal analysis, Project administration, Writing – original draft, Writing – review & editing. LZ: Data curation, Software, Writing – original draft, Writing – review & editing. XW: Data curation, Formal analysis, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft. BC: Data curation, Formal analysis, Investigation, Resources, Software, Writing – original draft.

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Conflict of interest

SC and BC were employed by Xipu Technological Entrepreneurship Development (Suzhou) Co., Ltd.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/forgp.2024.1435134/full#supplementary-material

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