

Article

The influence mechanism of Chinese lithium-ion battery new venture growth based on the perspective of entrepreneurial characteristics

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Abstract: Entrepreneurial self-efficacy has a predictive effect on entrepreneurial performance. The lithium-ion battery industry is the cornerstone of the emergency of the four emerging industries of “new energy”, “new materials”, “new technology” and “high-end manufacturing”. In the past, scholars have not considered the characteristics of entrepreneurs in their research on improving Chinese lithium-ion battery new venture growth. The personal characteristics of entrepreneurs have not received widespread attention from scholars. This article will start with the characteristics of entrepreneurs themselves and explore the path that entrepreneurs’ characteristics affect Chinese lithium battery new venture growth. This article builds a structural equation model to empirically analyze the relationship among variables. The data analysis results show that entrepreneurial self-efficacy significantly promotes the growth of new startups and entrepreneurial resilience plays a mediating role between the two. It cannot be concluded that entrepreneurial passion plays a positive moderation role between entrepreneurial self-efficacy and entrepreneurial resilience. Entrepreneurial passion also does not play a positive moderation effect between entrepreneurial self-efficacy and new venture growth. However, entrepreneurial passion plays a positive moderating role in the influence of entrepreneurial resilience on new venture growth. The findings of the study are beneficial for practitioners of Chinese lithium battery enterprises and will allow their strategies to promote sustainable new venture growth.

Keywords: entrepreneurial self-efficacy; new venture growth; entrepreneurship resilience; entrepreneurship passion; business corporation

1. Introduction

In the past decade, the Chinese government has introduced various entrepreneurial support policies, and private entrepreneurial activities have been extremely active (Zhe, 2021). However, New enterprises often face resource constraints as they grow due to their limited resource and capability base. The Chinese economy has entered a stage of “sub-rapid growth.” Innovation, adjustment, and acceleration of the emergence of strategic new law industries are the fundamental choices for China’s economy. The lithium-ion battery industry is the cornerstone of the development of the four emerging industries of “new energy”, “new materials”, “new technology” and “high-end manufacturing”. It is a new driving source for global economic development and industrial economic recovery (Gui, 2022).

Since the significant increase in the number of startups, scholars have been continuously exploring the growth of startups. Scholars have focused more on the financing issues of startups (Ye et al., 2012), corporate performance (Yong and Jia, 2013), innovation performance (Tao and Yu, 2012), and value issues (Guang et al., 2004), and through social networks of entrepreneurs, government talent policies.

Research on the growth performance of startups is conducted based on factors such as entrepreneurial networks and entrepreneurial learning (Jun et al., 2013). In the past, scholars have not considered the personal characteristics of entrepreneurs in their research on improving the new venture growth. The personal characteristics of entrepreneurs have not received widespread attention from scholars. This article will start with the characteristics of entrepreneurs themselves and explore the path that entrepreneurs' characteristics affect Chinese lithium battery new venture growth.

Entrepreneurial self-efficacy plays a highly important effect in determining the entrepreneurial willingness and behavior of entrepreneurs (Newman et al., 2019). Jian (2006) believes that entrepreneurial self-efficacy affects entrepreneurial performance through opportunity identification. Based on the above background, the following research objectives are proposed in this article:

- Objective 1: To explore the direct influence of entrepreneurial self-efficacy on Chinese lithium battery new venture growth.
- Objective 2: To analyze the indirect impact of entrepreneurial self-efficacy on Chinese lithium battery new venture growth, by considering the influence of entrepreneurial resilience.
- Objective 3: To explore the moderation effect of entrepreneurial passion among entrepreneurial self-efficacy, Chinese lithium battery new venture growth and entrepreneurial resilience.

2. Literature review

2.1. Related research on new venture growth

The new venture growth is a multifaceted, multidimensional, complex, and heterogeneous phenomenon (Delmar et al., 2003). Entrepreneurial literature research often portrays the growth of new businesses as the core of entrepreneurship (Sexton and Smilor, 1997) and proof of business success. This perspective has received special attention from entrepreneurship and strategic research literature (Wood and Davidson, 2011). On the contrary, in industrial organization literature, analysts view the growth of new enterprises as a necessary condition for their survival, innovation, and technological change (Yazdanfar, 2013), and the growth of new enterprises is also seen as path-dependent and persistent.

2.2. The influence of entrepreneurial self-efficacy on new venture growth

The entrepreneurial self-efficacy has a predictive effect on entrepreneurial outcomes (Drnovšek et al., 2010). Hallak et al. (2014) believe the promotive impact of entrepreneurial self-efficacy on entrepreneurial outcomes includes profit returns, corporate growth, and goal achievement. Forbes (2005) and Chen et al. (1998)' research clearly points out that people with high entrepreneurial efficacy often have higher innovation abilities, which are often manifested as high-tech innovation performance among technology entrepreneurship talents. The current study expects the following result based on previous evidence:

H1: The entrepreneurial self-efficacy positively influences new venture growth.

2.3. The mediation effect of entrepreneurial resilience between entrepreneurial self-efficacy and new venture growth

The research of Warner et al. (2013) shows persons with high self-efficacy intend to adopt a more positive attitude when facing difficulties and prepare in advance for other possible difficulties that may arise in the future, which are conducive to individuals' recovery from difficulties. Self-efficacy has a positive role in promoting psychological resilience. Entrepreneurs think that they have the power to effectively impact the entrepreneurial process, manage challenges, and cope with stressors, which can also affect their defense against these stressors. A firm belief in one's abilities gives entrepreneurs the confidence to overcome the adverse situations brought about by economic recession and business standstill and to explore new business opportunities (Ben and Fei, 2008).

For the resilience of entrepreneurs, emphasis is placed on their psychological state, indicating that they have not been depressed due to negative effects such as dissatisfaction or setbacks, and are able to recover and surpass themselves from difficulties, adversity, conflicts, and failures, thereby achieving success (Lafuente et al., 2019). The higher level of the resilience of entrepreneurs, the more they can calmly handle difficulties and help businesses resist various impacts from both internal and external sources. High resilience entrepreneurs have better adjustment abilities (Ayala and Manzano, 2014), able to adjust to external market changes, choose appropriate business strategies, and quickly carry out business around them to improve enterprise competitiveness. High resilience entrepreneurs can quickly emerge from difficulties, better learn and reflect from failed crises, and help companies quickly adjust to environmental changes (Ingram et al., 2015). Based on the above analysis, the current study suggests that entrepreneurial self-efficacy indirectly influences new venture growth in China by influencing entrepreneurial resilience, meaning that entrepreneurial resilience may play a mediating role between the two. Thus, the current study expects the following result based on previous evidence:

H2: Entrepreneurial resilience mediates the influence of entrepreneurial self-efficacy on new venture growth.

2.4. The moderation effect of entrepreneurial passion

In the process of entrepreneurship, the entrepreneurial passion represents the entrepreneur's identification with their entrepreneurial identity, manifested in a series of positive emotions such as focus and perseverance in dealing with entrepreneurial difficulties and failures (Neneh, 2022). It is often used throughout the entire entrepreneurial life cycle and can motivate entrepreneurial teams to actively recognize external environmental information to seek new entrepreneurial opportunities, accelerating the breakthrough growth of new startups. Therefore, entrepreneurial passion, as a fierce and positive feeling expression of entrepreneurs, has the effects of self-reinforcement and continuous motivation, making them adequately willing to invest more efforts to promote the entrepreneurial process, which is one of the key driving forces for entrepreneurial success. Entrepreneurs trust that they have the power to effectively impact the entrepreneurial process and deal with challenges and stressors, which can also affect their defense against these stressors. When entrepreneurs have a

high-level of entrepreneurial passion, it will make them more confident in overcoming the adverse effects of economic recession and business stagnation, and seeking new business opportunities (Sharma and Rautela, 2022). When facing difficulties, a high level of entrepreneurial passion can help entrepreneurs quickly recover their psychology and rebuild confidence. By comprehensively and thoroughly identifying entrepreneurial problems and summarizing failure experiences, they can enhance their entrepreneurial resilience (Santoso and Indudewi, 2022). The current study expects the following result based on previous evidence:

H3: Entrepreneurial passion positively moderates the influence of entrepreneurial self-efficacy on entrepreneurial resilience.

Entrepreneurs with a high sense of entrepreneurial self-efficacy often achieve better new venture growth during the entrepreneurial process (Forbes, 2005). When the entrepreneurial passion is at a high level, various unfavorable conditions in the entrepreneurial process will reduce many negative impacts on new startups, making entrepreneurs have a more optimistic sense of entrepreneurial self-efficacy towards entrepreneurial activities. This motivates entrepreneurs to actively discover the potential value of existing resources, actively explore new ideas, models, and approaches for creative resource utilization, and thereby leverage and integrate more external resources required for entrepreneurship, thus improving the growth potential of new startups (Liu et al., 2021). This study expects the following result based on previous evidence:

H4: Entrepreneurial passion positively moderates the influence of entrepreneurial self-efficacy on new venture growth.

Entrepreneurial resilience means strong identity recognition, which directly affects the behavior and corresponding entrepreneurial output of entrepreneurs (Rutter, 1985). The entrepreneurial resilience of entrepreneurs promotes the growth of new ventures. The research findings also confirm that high levels of passion are associated with resilience in stressful situations before exposure to stressors (Galatzer-Levy et al., 2013). High level passionate entrepreneurs enhance their ability to withstand pressure, enabling them to recover faster from stress and grow in adversity, and enhancing the impact of entrepreneurial resilience on new venture growth (Shan and Tian, 2022). The current study expects the following result based on previous evidence:

H5: The entrepreneurial passion positively moderates the influence of entrepreneurial resilience on new venture growth.

3. Methodology

3.1. Data collection

In order to analyze the impact of entrepreneurial self-efficacy on Chinese new venture growth, the current study will collect primary data to analyze the impact of individual psychological characteristics of entrepreneurs on new venture growth in China. This study will select executives from sample companies and collect first-hand data through online questionnaires. This study uses the Questionnaire Star platform to conduct a questionnaire survey by providing QR codes and links to the respondents.

3.2. Sampling

According to China Statistical Yearbook (2022), there are currently 3,466 lithium-ion battery companies in China (see **Table 1**). This article adopts the stratified sampling method. The sample size of this article is set as 384 and the extraction ratio is 11.08% for each layer (sample size/the number of target population). This study randomly selects corresponding samples in each layer according to the extraction ratio (see **Table 1**).

Table 1. Sampling.

Region	Number of Chinese Lithium-Ion Battery Enterprises	Sample Size
Guangdong Province	1067	118
Jiangsu Province	313	35
Shandong Province	200	22
Anhui Province	263	29
Zhejiang Province	209	23
Hunan Province	310	34
Henan Province	148	16
Hebei Province	45	5
Hubei province	153	17
Jiangxi Province	223	25
Xinjiang Uygur Autonomous Region	12	1
Qinghai Province	9	1
Gansu Province	14	2
Inner Mongolia Autonomous Region	19	2
Ningxia Hui Autonomous Region	9	1
Beijing	14	2
Tianjin City	14	2
Liaoning Province	28	3
Jilin Province	24	3
Heilongjiang Province	9	1
Shaanxi Province	40	4
Shanxi Province	38	4
Guangxi Zhuang Autonomous Region	24	3
Yunnan Province	12	1
Guizhou Province	45	5
Shanghai City	31	3
Chongqing City	40	4
Hainan	7	1
Fujian Province	148	16
Total	3466	384

3.3. Instrumentation

Zhao et al. (2005) developed a four-item scale to measure entrepreneurial self-efficacy (ESE). Respondents were asked to rate their level of confidence in successfully “identifying new business opportunities, creating new products or services, thinking creatively and commercializing ideas.” ESE has four dimensions. The items were designed on a 5-point scale, based on 1 “not very consistent” to 5 “very consistent”. Wei and Xiao’s (2007) develop an eight-item scale to measure the new venture growth (NVG) from the perspectives of competitiveness and technological innovation ability. This article used the Connor-Davidson Resilience Scale (Revised) to measure the variable of entrepreneurial resilience (ER), which contained ten items (Fatoki, 2018). This article employed a four-item scale which was developed by Cardon et al. (2012) to measure the variable of entrepreneurial passion (EP). EP tools include three dimensions. The items of the above three scales range from 1 (strongly disagree) to 5 (strongly agree).

3.4. Data analysis techniques

This study uses SPSS 23.0 and Macro Process 4.00 software to conduct hierarchical regression models to validate the moderating effects of hypotheses. Since the structural equation model is not yet perfect in verifying the moderation effect, we used the regression model to effectively analyze and complete the research ideas of this article. In the moderation effect test, it is necessary to manually construct the interaction term between the independent variable and the moderating variable, that is, the product of the independent variable and the moderating factor, and then build a moderating regression model together with the independent variable and moderating factor. In order to eliminate multicollinearity, it is necessary to center the independent and moderator variables before starting the test of moderating effects.

There might be some issues with structural equation modeling, which are connected to causality: 1) Perception bias. Personal past experience might affect the way people answering the questions. 2) Reverse causality. In order to eliminate perceptual bias, this study, when designing survey questionnaire questions, paid attention not to use questions that guide respondents to lean towards a certain answer, and considered the level of understanding of the respondents towards the question. To avoid the occurrence of reverse causality, when conducting a questionnaire survey, we measured ESE a year before measuring NVG.

4. Results

4.1. Profile of respondents

Table 2 displays respondents’ profile.

Table 2. Profile of respondents.

Demographic	Category	Frequency	Percentage (%)
Gender	Male	213	55.5
	Female	171	44.5

Table 2. (Continued).

Demographic	Category	Frequency	Percentage (%)	
Education Background		Below undergraduate	105	27.3
		Undergraduate	114	29.7
		Master	93	24.2
		Ph.D. or above	72	18.8
Marital Status		Single	98	25.5
		Living together or married	185	48.2
		Divorced	88	22.9
		Widowed	13	3.4
Age		Below 20	6	1.6
		20–30	43	11.2
		31–40	147	38.3
		41–50	128	33.3
		Above 50	60	15.6
Years of Establishment of the Firm		Less than one year	57	14.8
		1–3 years	191	49.7
		4–7 years	136	35.4
Number of Employees		No employee	8	2.1
		1–4	9	2.3
		5–9	52	13.5
		10–49	176	45.8
		50–100	114	29.7
		More than 100	25	6.5
Total			384	100.0

4.2. Reliability and validity tests

- Reliability Test

According to **Table 3**, the Cronbach’s alpha and Composite reliability of the four variable scales all meet the standards (>0.70).

Table 3. Reliability test results.

	Cronbach’s alpha	Composite reliability
EP	0.896	0.897
ER	0.945	0.947
ESE	0.918	0.920
NVG	0.947	0.949

- Convergence Validity Test

From **Table 4**, it can be seen that the standardized factor loading of all items of the four variables (entrepreneurial passion: EP; entrepreneurial resilience: ER; entrepreneurial self-efficacy: ESE; new venture growth: NVG) is greater than 0.6 Therefore, it can be concluded that all four variable scales in this article have good

convergent validity.

Table 4. Confirmatory factor analysis results.

	EP	ER	ESE	NVG	EP × ER	EP × ESE
EP1	0.718					
EP10	0.669					
EP11	0.687					
EP2	0.766					
EP3	0.727					
EP4	0.752					
EP5	0.715					
EP6	0.685					
EP7	0.710					
EP8	0.635					
EP9	0.637					
ER1		0.779				
ER10		0.845				
ER2		0.802				
ER3		0.759				
ER4		0.761				
ER5		0.802				
ER6		0.817				
ER7		0.881				
ER8		0.887				
ER9		0.847				
ESE1			0.701			
ESE10			0.680			
ESE15			0.681			
ESE16			0.659			
ESE17			0.717			
ESE18			0.701			
ESE2			0.668			
ESE3			0.727			
ESE4			0.755			
ESE5			0.726			
ESE6			0.799			
ESE7			0.637			
ESE8			0.652			
ESE9			0.640			
NVG1				0.820		
NVG2				0.811		

Table 4. (Continued).

	EP	ER	ESE	NVG	EP × ER	EP × ESE
NVG3				0.852		
NVG4				0.835		
NVG5				0.848		
NVG6				0.876		
NVG7				0.883		
NVG8				0.903		
EP × ESE					0.477	
EP × ER						0.477

- Discriminant Validity Test

Table 5 shows the discriminant validity results. As can be seen from **Table 5**, the square root of AVE of the four latent variables are all greater than the absolute value of the correlation coefficient between latent variables. It can be concluded that all variable scales have good discriminant validity.

Table 5. Discriminant validity results.

	EP	ER	ESE	NVG	EP × ER	EP × ESE
EP	0.701					
ER	0.620	0.819				
ESE	0.450	0.483	0.697			
NVG	0.645	0.517	0.619	0.854		
EP × ER	0.158	0.102	0.167	0.032	0.668	
EP × ESE	0.097	0.160	0.287	0.172	0.477	0.789

Note: The bold value in the upper right corner is the square root of AVE, and other values are the correlation coefficients between latent variables.

4.3. Mediation and moderation effect analysis

Following a thorough examination of the size effect analysis presented in **Table 6**, it is discerned that entrepreneurial self-efficacy exhibits a promotive impact on the entrepreneurial resilience ($b = 0.2795$, $p = 0.000$). Entrepreneurs with high self-efficacy experience elevated confidence levels, resulting in heightened resilience. Furthermore, entrepreneurial passion is not observed to wield moderating effects in the influence of entrepreneurial self-efficacy (Int_1) on entrepreneurial resilience ($b = -0.0343$, $p = 0.4101$, or a 95% confidence interval inclusive of 0). The additional statistical indicators, such as $R^2_{\text{change}} = 0.0055$ and $F = 83.6970$ with a significance level of $p = 0.000 < 0.05$, underscore the robustness of this finding. **Figure 1** depicts the term entrepreneurial passion has a significant impact on entrepreneurial resilience, indicating that the love and enthusiasm for one’s work have a profound impact, leading entrepreneurs to refuse to give up and actively adapt to changing situations. Even though entrepreneurial passion may not directly affect entrepreneurial self-efficacy and its impact on entrepreneurial resilience, it plays a crucial role in fostering a high level of psychological flexibility in dealing with changing circumstances.

Table 6. Effect of entrepreneurial passion as moderator variable between entrepreneurial self-efficacy and entrepreneurial resilience.

Variable	Coefficient	Standard error	t-value	p-value	LLCI	ULCI
ESE	0.2795	0.0460	6.0753	0.0000	0.1891	0.3700
EP	0.4537	0.0438	10.3501	0.0000	0.3675	0.5399
Int_1	-0.0343	0.0416	-0.8246	0.4101	-0.1160	0.0474

$R = 0.6308$, $R^2 = 0.3979$, $MSE = 0.6069$, $F = 83.6970$, $df1 = 3.000$, $df2 = 380$, $p = 0.000$, $R^2_change = 0.0055$.

Note: 1. Int_1 (Interaction 1): ESE × EP; (2). LLCI: lower levels for confidence interval, ULCI: upper levels for confidence interval; 3. Dependent variable is ER

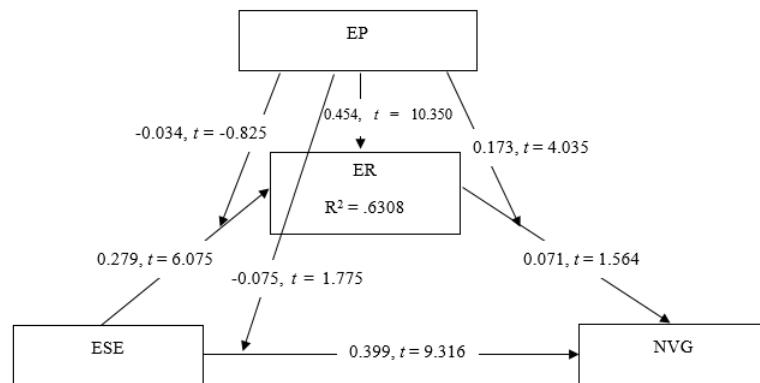


Figure 1. Moderating effects of entrepreneurial passion on entrepreneurial self-efficacy, entrepreneurial resilience, and new venture growth.

The findings from **Table 7** reveal a noteworthy relationship between entrepreneurial self-efficacy and new venture growth ($b = 0.3993$, $p = 0.001$), underscoring the pivotal influence of self-efficacy in directing entrepreneurial efforts towards fostering growth. It is worth noting that entrepreneurial passion has a moderation effect in the influence of entrepreneurial resilience on new venture growth (Int_1 in **Table 7**) does not attain a 0.05 statistical significance level ($b = -0.0750$, $p = 0.076$).

Table 7. Effect of entrepreneurial passion as moderator variable between entrepreneurial self-efficacy and new venture growth through entrepreneurial resilience as mediator variable.

Variable	Coefficient	Standard error	t-value	p-value	LLCI	ULCI
ESE	0.3993	0.0429	9.3164	0.0000	0.3151	0.4836
ER	0.0714	0.0456	1.5641	0.1186	-0.0184	0.1611
EP	0.4071	0.0446	9.1220	0.0000	0.3193	0.4948
Int_1	-0.0750	0.0423	-1.7753	0.0766	-0.1582	0.0081
Int_2	0.1732	0.0429	4.0347	0.0001	0.0888	0.2575

$R = 0.7259$, $R^2 = 0.5269$, $MSE = 0.4794$, $F = 84.1940$, $df1 = 5.000$, $df2 = 378$, $p = 0.000$, $R^2_change = 0.0055$

Note: (1) Int_1 (Interaction 1): ESE × EP, Int_2 (Interaction 2): ER × EP; (2) LLCI: lower levels for confidence interval, ULCI: upper levels for confidence interval; (3) Dependent variable is NVG

In contrast, entrepreneurial passion plays a statistically significant moderation role in the relationship between entrepreneurial resilience and new entrepreneurial

growth (Int_2) ($b = 0.1732$, $t = 4.0347$, $p = 0.001$), when entrepreneurial passion intensifies, it serves as a catalyst for enhanced entrepreneurial resilience, consequently leading to a notable increase in new venture growth. The high-level passion of entrepreneurs helps them cope with challenges, persevere in the face of setbacks, and actively adapt to the constantly changing environment. This in turn has a positive cascading effect on the growth trajectory of new enterprises. Moreover, the infusion of passion injects a sense of purpose and determination into the entrepreneurial journey, motivating individuals to not only overcome obstacles but also to seek innovative solutions and seize emerging opportunities. The connection between entrepreneurial passion, resilience, and new venture growth highlights the dynamic interaction between the emotional commitment of entrepreneurs and the overall success and expansion of the enterprise.

When considering the direct and indirect conditional effects of entrepreneurial self-efficacy on the growth of new entrepreneurship, it is believed that entrepreneurial resilience plays the mediating effect with the moderation effect of entrepreneurial passion. The results proved that the entrepreneurial passion had moderating effect between entrepreneurial self-efficacy and new venture growth with statistically significant at 0.010, entrepreneurial passion has, also, moderating effects with entrepreneurial resilience on new venture growth with statistically significant at 0.001. In this result, we will consider the indirect influence of entrepreneurial resilience on the conditions for new venture growth through the moderating effect of entrepreneurial passion. Three cases of the slope are shown in **Table 8**. The indirect impact of entrepreneurial self-efficacy on new venture growth in situations where entrepreneurial passion is at a low or moderate level. But when EP is at the high value the indirect impact of ESE on new venture growth was significant ($b = 0.064$, $BootLLCI = 0.0143$, $BootULCI = 0.1205$). High levels of entrepreneurial passion significantly affect entrepreneurial self-efficacy, leading to increased new venture growth due to enhanced entrepreneurial resilience. Entrepreneurial passion at moderate or low levels does not result in this effect. The research findings demonstrate that there is a significant statistical relationship between the strong self-efficacy of entrepreneurs and the improvement of their resilience level. In simple terms, they have a lower tendency to give up, are more inclined to recover from losses, and demonstrate persistence in the face of adversity, leading to greater success in new ventures. This study highlights the fact that a deep enthusiasm for one’s work (entrepreneurial passion) not only shows a connection with but also actively aids in propelling the growth of new ventures to greater heights.

Table 8. Conditional indirect effects entrepreneurial self-efficacy on new venture growth through entrepreneurial resilience moderated by entrepreneurial passion.

Entrepreneurial passion	Effect	BootSE	BootLLCI	BootULCI
-1.0557(low value)	-0.0352	0.0223	-0.0815	0.0069
0.0545 (medium value)	0.0224	0.0145	-0.0041	0.0522
1.1219 (high value)	0.0640	0.0274	0.0143	0.1205

The results show that the fundamental role of self-efficacy in entrepreneurial

success has been emphasized. Entrepreneurs with high levels of self-efficacy toward to exhibit resilience, initiative, and a proactive approach to addressing business challenges, contributing to the overall growth of their ventures. However, the entrepreneurial landscape is multifaceted, and the presence of entrepreneurial passion introduces an additional layer of complexity to this relationship. Entrepreneurial passion, characterized by intense positive feelings and emotional attachment to the venture, serves as a moderator that can either enhance or diminish the influence of self-efficacy on new venture growth.

Entrepreneurial passion serves as a catalyst, amplifying the influence of entrepreneurial self-efficacy. When entrepreneurs are deeply passionate about their work, their emotional commitment fuels a heightened dedication to realizing their venture goals. This passion transforms self-efficacy beliefs into practical actions, cultivates a resilient mindset, and enables entrepreneurs to persevere in adversity. Entrepreneur's passion goes beyond a simple additive effect. It synergistically interacts with self-efficacy and creates a dynamic relationship. Passionate entrepreneurs are more likely to leverage their self-efficacy in innovative problem-solving and strategic decision-making, thereby positively influencing the trajectory of new venture growth. Conversely, when entrepreneurial passion is lacking or moderate, self-efficacy may have a limited impact on new venture growth. The emotional drive and commitment that passion provides are integral to transforming self-efficacy into sustained effort and resilience. Without this moderating effect, self-efficacy alone may not fully realize its potential for driving entrepreneurial success.

In summary, entrepreneurs should not only focus on enhancing their self-efficacy but also recognize the importance of cultivating and sustaining passion as a powerful moderator that can propel their ventures to greater heights.

Moreover, **Figure 2** depicts distinctive slopes for the equation lines representing low, middle, and high levels of entrepreneurial passion in relation to new venture growth. The graphical representation underscores a noteworthy trend in the results. Entrepreneurs with high passion levels exhibit a significant moderation of entrepreneurial resilience, resulting in a steep slope for new venture growth, indicative of a substantial positive impact on venture growth. This aligns with the expectation that heightened passion enhances the positive influence of resilience on entrepreneurial success. Conversely, entrepreneurs with moderate passion levels display a moderated effect on entrepreneurial resilience, but the influence on new venture growth appears less pronounced compared to their high entrepreneurial passion counterparts. This nuanced finding suggests that while moderate passion contributes to the moderation of resilience, the subsequent impact on venture growth may not be as robust as observed in entrepreneurs with high passion. This nuance introduces a layer of complexity to the relationship, emphasizing the role of passion intensity in shaping the resilience-venture growth dynamic. In contrast, entrepreneurs with low passion levels demonstrate a negative moderation of entrepreneurial resilience, leading to a negative slope in new venture growth. This intriguing result implies that low passion levels may impede the positive impact of resilience on venture growth, potentially resulting in adverse outcomes. This finding prompts further exploration into the specific mechanisms through which low passion may hinder the beneficial effects of resilience in the entrepreneurial context.

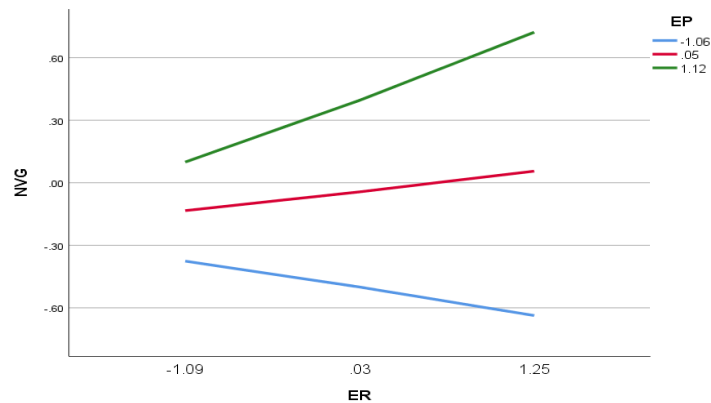


Figure 2. The lines present the relationship between ER and new venture growth for low, medium and high entrepreneurial passion.

In summary, the divergent slopes in **Figure 2** highlight the differentiated impact of passion levels on the moderation of resilience and subsequent effects on venture growth. This nuanced analysis contributes valuable insights to our understanding of how varying intensities of entrepreneurial passion shape the outcomes of resilience in the context of new enterprise development.

5. Discussion

- Effect of entrepreneurial self-efficacy on new venture growth (H1)

The research results indicate that the entrepreneurial self-efficacy has a promotive impact on new venture growth of Chinese lithium-ion battery enterprises, which is consistent with the research hypothesis H1. The results are consistent with those of Lindsley et al. (1995) and Trevelyan (2011). They argued entrepreneurial self-efficacy could promote new venture growth. Specifically, entrepreneurs have a high sense of entrepreneurial self-efficacy, which means they have strong confidence in their ability to complete corresponding tasks in the field of entrepreneurship (Lindsley et al., 1995), set challenging goals, and motivate themselves to invest more effort in entrepreneurial tasks, demonstrate more persistence and perseverance, and be able to recover faster from failures, to achieve these goals (Trevelyan, 2011). The efforts invested by entrepreneurs will also be reflected in the growth of the enterprise (Wood and Bandura, 1989), which means that entrepreneurial self-efficacy will encourage entrepreneurs to convert their belief in achieving entrepreneurial success into efforts, thereby enhancing the growth potential of the enterprise.

- Mediation effect of entrepreneurial resilience between entrepreneurial self-efficacy and new venture growth (H2)

Empirical research results indicate that entrepreneurial resilience plays a mediation effect in the influence of entrepreneurial self-efficacy on new venture growth in Chinese lithium-ion battery companies, which is consistent with the research hypothesis H2. The results are consistent with those of Vizcaíno et al. (2021) and Timmons (1978).

Türk-Kurtça and Kocatürk (2020) pointed out that self-efficacy predicts the level of psychological resilience. The research by Mao et al. (2023) proved that self-efficacy positively influences the total score and each dimension of psychological resilience,

and self-efficacy plays a partial mediation effect between social support and psychological resilience. Personals with high resilience are also individuals with high self-efficacy (Gu and Day, 2007). When an individual encounters obstacle and falls into a stalemate in the process of handling tasks, their belief in their own abilities becomes the driving power which motivates them to move forward. The research findings of Ayala and Manzano (2014) add empirical evidence that entrepreneurial resilience positively impacts on entrepreneurial growth, and support Hayward et al.'s previous research findings that entrepreneurial resilience has a positive impact on the growth of new startups. To achieve sustainable growth for startups, entrepreneurs need an entrepreneurial resilience, enhanced motivation and belief to cope with challenges, enabling them to overcome critical situations during the entrepreneurial process, rely on their strong willpower to break through the difficulties in the growth of startups, and make themselves stronger than before to emerge from failures and crises (Reivich and Shatté, 2002).

- Moderation effect of entrepreneurial passion (H3 – H5)

The data analysis results cannot support the hypothesis of H3, namely, entrepreneurial passion does not play a moderation effect in the influence of entrepreneurial self-efficacy on entrepreneurial resilience. Entrepreneurial passion can influence the behavioral outcomes of entrepreneurs in a variety of ways. However, different categories of entrepreneurial passion may have different impact outcomes. Feng and Chen (2020) believe that passion can be divided into two categories: harmonious passion and obsessive passion. The former means the individual's independent choice of activities they enjoy, generating positive emotions, and obtaining more fulfilling experiences. The latter refers to negative emotions generated by the passive pressure of individuals participating in activities they enjoy. The difference between the two is shown below. Firstly, harmonious passion is more flexible and harmonious than obsessive passion, and tends to generate more positive emotions. Secondly, harmonious passion is more effective in encouraging people to persist in an activity than being obsessed with passion (Zheng and Liu, 2022). When people realize they can benefit from the activity, they stick with it. On the contrary, if negative emotions occur frequently, people will reduce or even stop their activities. In this article, it may be due to the observation that EP does not moderate the effect of ESE on ER.

The results show that entrepreneurial passion does not play a moderation effect between entrepreneurial self-efficacy and new venture growth of Chinese lithium-ion battery enterprises, which is not consistent with the research hypothesis H4. Entrepreneurial passion also affects entrepreneurial behavior through mediating factors such as cognitive processes and intrinsic motivation. Research shows that emotions influence entrepreneurial behavior by affecting cognitive processes. When entrepreneurs with higher entrepreneurial passion face adverse market information, they become less sensitive and persist in their previous behaviors (Feng and Chen, 2020). In this article, perhaps due to the lack of specific antecedents of entrepreneurial passion, EP does not play a moderating role in the impact of ESE on NVG.

The results show that entrepreneurial passion plays a positive moderating effect between entrepreneurial resilience and new venture growth of Chinese lithium-ion battery enterprises, which is consistent with the research hypothesis H5. Cardon and

Kirk (2015) pointed out that entrepreneurial passion is an important factor in studying entrepreneurial resilience. If researchers do not consider passion or other emotions in their studies of entrepreneurial resilience, they may miss out on a full understanding of the drivers of entrepreneurship and other important outcomes. When the entrepreneurial passion of entrepreneurs is high, they possess a strong positive emotion that stimulates their entrepreneurial motivation (Pradhan et al., 2017), making them passionate and able to overcome the inherent challenges of entrepreneurship and management and enhancing their entrepreneurial resilience (Ranfagni and Runfola, 2018). In a fiercely competitive market environment, high entrepreneurial passion makes entrepreneurs unwaveringly pursue challenging goals (Smilor, 1997), which are to improve the performance of new startups, enhance their competitiveness, and promote their continuous growth. A high entrepreneurial passion promotes the development of entrepreneurs' abilities, skills, and knowledge, thereby improving their innovation level (Martin and Schouten, 2014).

6. Conclusion

This article examines the impact of entrepreneurial self-efficacy on new venture growth, introducing the mediation role of entrepreneurial resilience and the moderation role of entrepreneurial passion. In the empirical analysis section of this study, we first tested the internal consistency reliability, convergence validity, discriminant validity, and normality of 384 valid sample data collected through formal research. This article used AMOS to construct a structural equation model to test the hypotheses: H1 & H2. The SPSS 23.0 software is used to test the moderation effects (H3–H5).

Empirical research indicates that entrepreneurial self-efficacy promotes new venture growth; Entrepreneurial resilience plays a mediation effect between the two; It cannot be concluded entrepreneurial passion plays a positive moderation role between entrepreneurial self-efficacy and entrepreneurial resilience; Entrepreneurial passion also does not play a positive moderation effect between entrepreneurial self-efficacy and new venture growth; However, entrepreneurial passion plays a positive moderating role in the influence of entrepreneurial resilience on new venture growth.

- **Theoretical Implications.**

Firstly, the personal characteristics and behaviors of entrepreneurs are currently a hot research topic. Therefore, this article explores the direct influence of entrepreneurial self-efficacy on new venture growth from the perspective of individual characteristics of entrepreneurs, and introduces entrepreneurial resilience as a mediation role and entrepreneurial passion as a moderation role. Secondly, there is limited literature on exploring the influence of individual traits on the growth of new startups. Therefore, this study takes entrepreneurial self-efficacy as the explanatory variable and confirms that entrepreneurial self-efficacy positively influences new venture growth, adding new content to the entrepreneurial self-efficacy theories. Thirdly, this study gradually analyzed and validated the intrinsic effect of entrepreneurial resilience and entrepreneurial passion in the influence of entrepreneurial self-efficacy on new venture growth. This study increases the influence path of entrepreneurial self-efficacy on the growth of new ventures, enriches

relevant entrepreneurial theories, and provides inspiration for future research by scholars.

- **Practical Implications.**

Firstly, improving entrepreneurial self-efficacy is of great significance for Chinese lithium-ion battery industry enterprises to engage in entrepreneurship. Research has shown that a high-level sense of entrepreneurial self-efficacy can actively promote the growth of new startups. Entrepreneurs should actively learn and acquire corresponding entrepreneurial knowledge and skills, and improve their decision-making ability for entrepreneurial activities. Secondly, enhancing one's entrepreneurial resilience is of great value to entrepreneurs of Chinese literacy on battery new ventures. Entrepreneurs should have the characteristic of "resistance to twists and turns". In order to cultivate entrepreneurs' entrepreneurial resilience, entrepreneurs and aspiring entrepreneurs need to take the following three actions: (1) participate in business development training to establish a belief in their entrepreneurial ability; (2) Find online activities, special lectures, and guidance opportunities to enhance the entrepreneurial resilience of entrepreneurs through "role models" learning; (3) Actively engage in entrepreneurial activities, enhance practical business acumen, and seek feedback from those who are objective, critical, and inspiring.

- **Limitations and future research directions.**

Due to the fact that entrepreneurial self-efficacy, entrepreneurial resilience, entrepreneurial passion, and the growth of new startups involve many dimensions, this study only explores them from a holistic perspective and does not consider whether the relationship between each dimension is consistent with the original results, resulting in a certain limitation. In the future, further refinement and research can be conducted on how the various dimensions of entrepreneurial self-efficacy affect the growth of new startups through the dimensions of entrepreneurial resilience and entrepreneurial passion.

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