



RESEARCH ARTICLE

Entrepreneurial education affects Entrepreneurial Intentions from the perspective of the Positive Emotion Theory

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ARTICLE INFO

Received: Jul 16, 2024

Accepted: Sep 18, 2024

Keywords

Entrepreneurial education
Entrepreneurial intention
Entrepreneurial passion
Proactive personality
Moderated Mediation Model
Positive emotion theory

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ABSTRACT

Grounded in Positive Emotions Theory (PET), this study proposes and empirically tests a moderated mediation model to explore the mediating role of entrepreneurial passion (EP) in the relationship between university students' perceived entrepreneurship education (PEE) and their entrepreneurial intentions (EI), as well as the moderating effect of proactive personality (PP). Utilizing a convenience sampling method, the study surveyed 788 students from three universities in Zhejiang Province of China, and employed PROCESS to validate the data. The results reveal that students' perceived entrepreneurship education have a significantly positive effect on their entrepreneurial intentions. Entrepreneurial passion partially mediates the relationship between perceived entrepreneurship education and entrepreneurial intentions, while students' proactive personality moderates the latter part of this pathway. This study enriches our understanding of the potential effects of perceived entrepreneurship education on entrepreneurial intentions from an emotional perspective and identifies that students with a high level of proactivity are more inclined towards entrepreneurial intentions, offering valuable insights for educational administrators in higher education on fostering entrepreneurial intentions among students.

INTRODUCTION

With the global promotion and widespread adoption of entrepreneurship, the emphasis on entrepreneurship education (EE) has increasingly heightened across various countries and regions (Fretschner & Weber, 2013; Nabi et al., 2018). University students, as vital members of society, are regarded as one of the most promising groups for entrepreneurial endeavors due to their strong learning capabilities and innovative spirit (Barba-Sánchez, 2022). Thus, fostering entrepreneurship among university students not only contributes to the diversification of individual career development but also introduces new avenues for economic growth within society (Hassan et al., 2020). As an educational approach that systematically cultivates students' entrepreneurial skills and awareness through structured courses and practical activities, EE is progressively becoming a core component of higher education (Boldureanu et al., 2020). Consequently, the entrepreneurial rate among university students has emerged as a crucial indicator of the effectiveness of EE within higher education institutions (Sherkat & Chenari, 2022).

Entrepreneurial intention (EI) has remained a central theme in academic research. Numerous studies have demonstrated that EI is a significant predictor of entrepreneurial behavior among university students (Lihua, 2022; Yi, 2021). According to the Theory of Planned Behavior, intentions are the

precursors of actions (Ajzen, 1991), and entrepreneurial behavior, as a prototypical planned behavior (Lihua, 2022), underscores the critical role of EI in evaluating the effectiveness of EE (Martínez-Gregorio et al., 2021).

Although many studies have highlighted the positive influence of EE on EI among university students, the majority of research has primarily concentrated on its direct effects (Mei et al., 2020; Fretschner & Weber, 2013) and cognitive factors in entrepreneurial learning, such as the stimulation of entrepreneurial inspiration (Nabi et al., 2018), the identification of Startup opportunities (Hassan et al., 2020), and perceived norms (Ajzen, 1991). However, there has been relatively less attention given to the underlying psychological and emotional transformation mechanisms experienced by students during EE (Bonesso et al., 2018; Schlaegel & Koenig, 2014). Specifically, students' subjective perceptions of the content and effectiveness of EE may influence their EI through emotional factors such as EP. Research suggests that passion, as a positive emotion, can motivate entrepreneurs to persist in their efforts and focus on realizing enterprise ideas (Cardon et al., 2009). Therefore, EP may serve as a crucial driving force in fostering entrepreneurship (Cardon et al., 2009). Nevertheless, a substantial gap exists in research regarding the role of EP within the context of EE (Nabi et al., 2017), warranting further exploration.

Addressing this research gap, the present study aims to further explore how EE fosters the development of EI among university students through emotional mechanisms. Drawing on the broaden-and-build theory of positive emotions and related entrepreneurial literature, EP, as a positive emotion, is posited to expand individuals' cognitive scope regarding entrepreneurship, enhancing their sensitivity to the market environment, thereby facilitating the identification of entrepreneurial opportunities and the formation of EI (Fredrickson, 2001; Cardon et al., 2009). Empirical research also indicates that EP has a significant positive impact on EI (Neneh, 2022). Therefore, this study hypothesizes that EP may serve as a mediating factor in the relationship between students' PEE and their EI. Furthermore, individuals' responses to environmental stimuli vary, with some exhibiting reactivity while others display proactive behavior. Bateman and Crant (1993) argue that proactive individuals actively seek opportunities, demonstrate initiative, and persistently pursue their goals until change is achieved. As a result, proactive individuals are more likely to seek out favorable entrepreneurial experiences and outcomes. Consequently, this study also posits that PP may play a moderating role in the influence of EP on EI.

In summary, this study aims to utilize a moderated mediation model to explore how EE influences EI from the perspective of positive emotions. Specifically, the research will investigate the potential mediating role of EP in the relationship between PEE and EI, as well as the moderating effect of PP within this relationship. We will examine whether students' PEE indirectly affect their EI through EP and whether this mediating effect is moderated by PP. A deeper understanding of these influences not only provides students with guidance in their entrepreneurial learning but also assists educators and entrepreneurship managers in offering more tailored support to students with varying levels of PP.

1. THEORETICAL BASIS AND HYPOTHESIS DEVELOPMENT

2.1 Positive Emotion Theory (PET)

With the rise of positive psychology and positive organizational research, PET has garnered increasing attention from both theoretical and practical perspectives, becoming a foundational theory for explaining how positive emotions impact individuals and organizations. Within educational literature, fostering positive emotions is emphasized as a critical factor in enhancing educational outcomes. Accordingly, this study attempts to construct a theoretical model of how EE influences university students' EI through the lens of PET.

At the heart of PET is the broaden-and-build theory of positive emotions (Fredrickson, 1998). This theory posits that positive emotions serve several critical functions. First, positive emotions can broaden individuals' attention and cognition, enabling them to explore new possibilities and think more flexibly (Fredrickson, 1998). Positive emotions enhance creativity, problem-solving abilities, and cognitive flexibility, thereby promoting well-being and personal growth (Yang, 2022). Therefore, in the context of EE, if students' EP—a form of positive emotion—can be stimulated, it may broaden their focus on EE and their understanding of entrepreneurial skills, inspire more entrepreneurial ideas, and aid in identifying entrepreneurial opportunities, thereby strengthening their EI.

Second, positive emotions contribute to the building of personal resources. They foster the development of physical, intellectual, psychological, and social resources, which are particularly crucial when facing stress or adversity (Yang, 2022). The entrepreneurial process often requires individuals to navigate ever-changing market environments and various obstacles, which may bring psychological stress and necessitate the mobilization of social resources and support. Thus, positive emotions can help entrepreneurs build the necessary psychological and social resources. If EE can evoke positive emotions, it may enhance university students' EI.

Moreover, an increasing number of empirical studies have shown that positive emotions can counteract negative emotions, strengthen resilience, foster self-motivation, and improve academic performance (Aguilar et al., 2019). These factors all contribute to the formation of EI. If university students experience more joy and interest during EE, they are more likely to continue participating in entrepreneurial activities, thereby increasing the likelihood of developing EI. In this process, resilience and self-motivation can help sustain EP, further encouraging students to identify with the role of an entrepreneur and enhancing their EI.

In summary, according to PET, EP plays a crucial role in broadening individual entrepreneurial cognition and capabilities, building entrepreneurial resources, and fostering EI and growth. Therefore, this study hypothesizes that EP may mediate the impact of students' PEE on EI. Additionally, individual proactivity may amplify the driving effect of EP on EI. Specifically, individuals with high proactivity, driven by EP, are more likely to actively seek opportunities and take action, thereby generating stronger EI. Consequently, this study posits that PP may moderate the influence of EP on EI.

2.2 EE and EI

EE refers to a combination of courses and activities related to entrepreneurship (Souitaris et al., 2007). Recent studies have shown that entrepreneurship education (EE) can produce various entrepreneurial outcomes (Wong & Chan, 2022; Kozlinska, 2012). However, there is still debate over whether entrepreneurship can be effectively taught or trained (Lekoko et al., 2012; Scott et al., 2018).

Wei and Duan (2024) pointed out that education can cultivate or enhance several factors related to entrepreneurship. These factors can stimulate entrepreneurship-related human capital, thereby improving individuals' ability to identify business opportunities (Aboobaker, 2020). The approaches and strategies provided through entrepreneurship courses and training, such as business planning and market analysis, assist in identifying high-value and revenue-generating ideas. In addition, EE can mobilize human capital with specific entrepreneurial characteristics to leverage opportunities and enhance expected outcomes. Entrepreneurship courses provide participants with the skills to convert a business idea into a viable market opportunity. This involves learning strategies for market entry, securing resources, and managing joint ventures. In this context, studies have shown that entrepreneurial human capital positively impacts both entrepreneurial self-efficacy (Ghouse et al., 2024) and business performance (Paunović, 2021).

Particularly, EE extends beyond individual courses, encompassing a range of related courses and activities (Kakouris & Liargovas, 2021). Souitaris et al. (2007) identify four key components of 'best

practice' EE programs: (1) a 'teaching' component that includes entrepreneurship courses and lectures; (2) a 'business plan' component focused on developing business ideas and hosting business plan competitions; (3) a 'practical interaction' component involving direct engagement with entrepreneurs and networking activities; and (4) an 'organizational support' component providing market research assistance, technical support, and seed funding to student teams. From this perspective, during the process of receiving entrepreneurship education, students can enhance their sense of identity regarding their entrepreneurial abilities through activities such as simulated business scenarios, case analyses, and entrepreneurial competitions (Celuch et al., 2017). This sense of identity effectively boosts their intention to pursue entrepreneurship (Celuch et al., 2017). Additionally, entrepreneurship education can help lower psychological barriers by providing practical resources and support, making students more inclined to consider entrepreneurship as a career choice in the future (Bell & Bell, 2020).

Based on the above, we posit that there may be a positive relationship between EE in higher education institutions and EI, leading to the following hypothesis:

H1: PEE has a significant positive impact on EI.

2.3 The Mediating Role of EP

Entrepreneurial passion is defined as a strong and enduring emotional state that individuals experience during the entrepreneurial process (Cardon et al., 2009). Vallerand et al. (2003) pointed that passion served as a source of energy that drives individuals to engage more deeply in activities and enhance their performance. Empirical evidence has demonstrated that passion not only prolongs individuals' engagement with activities but also facilitates goal attainment and performance improvement (Vallerand, 2010). According to the theory of positive emotions, entrepreneurial passion, as a type of positive emotion, can broaden college students' cognitive horizons, increase their sensitivity to entrepreneurial opportunities, and enhance their confidence and ability to tackle entrepreneurial challenges (Fredrickson, 2001). Entrepreneurship training not only conveys essential knowledge and skills but also fosters students' entrepreneurial passion through various teaching methods, including business plan competitions, simulations, and case studies (Liao et al., 2023).

This passion, fueled by positive emotions, not only motivates students to maintain their cognitive and emotional engagement in entrepreneurial activities but also enhances their perseverance and innovative abilities when confronted with uncertainty and challenges, ultimately leading to a strong entrepreneurial intention (Ávila et al., 2023).

Empirical studies have provided significant support. A meta-analysis by Bae et al. (2014) found that although entrepreneurial education generally has a positive effect on entrepreneurial intentions, the strength of this effect varies based on research methods and sample characteristics. This variation suggests the existence of potential mediating or moderating factors. Further research by Neneh (2022) highlighted that entrepreneurial passion, as a powerful intrinsic motivator, can significantly mediate the impact of perceived entrepreneurial education on entrepreneurial intentions. Specifically, students who receive entrepreneurial education are likely to develop stronger entrepreneurial passion as they gain more knowledge and practical experience, and further enhances their entrepreneurial intentions (Neneh, 2022). Shapero and Sokol (1982) emphasize the role of passion in the entrepreneurial process, considering it a key factor in prompting individuals to discover and pursue entrepreneurial opportunities. Individuals with passion are more prone to show EI and take action to realize their ideas (Shapero & Sokol, 1982). Karimi (2020) investigated the EI of students and found that passion is a significant predictor of entrepreneurial intent, with students who are passionate about entrepreneurship being more likely to express their EI. Passion acts as a driving force that motivates individuals to seek opportunities, develop ideas, and take action to

implement entrepreneurship. It encourages individuals to pursue entrepreneurial opportunities, invest time and effort, and maintain a positive attitude when facing challenges. EP can ignite the desire to engage in entrepreneurial activities. When individuals passionately contemplate entrepreneurial opportunities and energetically develop new products or services, they are more likely to possess EI. Passion can also serve as an intrinsic motivator for individuals to take concrete actions and start new ventures. In summary, there may be a positive relationship between EE, EP, and EI. Thus, we propose the following hypothesis:

H2: EP mediates the impact of PEE on EI.

2.4 The Moderating Role of PP

This study posits a close connection among PP, EP, and EI, suggesting that PP may moderate the effect of EP on EI. This can be elaborated through the following three points: Firstly, PP traits typically include self-drive, decisiveness, and goal orientation, which make individuals more likely to take proactive actions in the face of entrepreneurial opportunities and challenges (Bateman & Crant, 1993). This proactive attitude and behavior can stimulate a strong interest and passion for entrepreneurial activities (Van et al., 2020). Kickul et al. (2009) investigated that individuals with a proactive cognitive style (characterized by action preference and initiative) are more likely to possess higher entrepreneurial self-efficacy. This suggests that individuals with a PP are more confident in their ability to succeed in entrepreneurial activities, thereby enhancing their EP. Rauch and Frese (2007), through a meta-analysis of the relationship between entrepreneurs' personality traits, venture creation, and success, found that PP traits are associated with higher entrepreneurial activity tendencies and the development of EP. Liñán and Fayolle (2015) emphasized the importance of personality traits, including proactivity, in shaping EI in their systematic review. They noted that proactive individuals are more likely to develop strong entrepreneurial desires and exhibit higher entrepreneurial enthusiasm. Moreover, such individuals are more likely to respond positively to entrepreneurial opportunities, actively pursue innovation and development, thus enhancing their EP (Liñán & Fayolle, 2015).

Secondly, individuals with high proactivity often possess self-drive, a proactive tendency to seek opportunities, and an inclination towards autonomy and innovation (Bateman & Crant, 1993), traits closely related to entrepreneurial activities. Hu et al. (2018) explored the relationship between creativity, PP, and EI, finding that individuals with proactive personalities are more likely to exhibit EI through intermediary mechanisms such as entrepreneurial alertness. Furthermore, Cardon and Kirk (2015) proposed that EP is a positive emotion arising from engagement in activities of significant importance to one's entrepreneurial identity. This suggests that proactive persons are more inclined to experience and demonstrate EP, which, in turn, drives their EI. Additional research has examined the relationship between positive personality traits (such as proactivity, self-efficacy, and creativity) and EI (Tian et al., 2022; Suratman & Roostika, 2022; Li et al., 2022; Feola et al., 2017). Consequently, individuals with high proactivity are more likely to demonstrate relatively positive EI.

Lastly, in the impact of EP on EI, individuals with high proactivity are often more proactive in exploring new opportunities, willing to take risks, and pursuing their goals. Baron (2008) emphasized the significant role of emotions in the entrepreneurial process, noting that EP, as a positive emotional state, can significantly influence individuals' EI. Proactive individuals generally possess an action-oriented mindset, making them more likely to be driven by EP, actively exploring new opportunities, taking risks, and achieving personal goals. Cardon et al. (2009) suggested that EP involved a strong inclination and commitment to entrepreneurial activities. Zhao et al. (2005) further supported this view, asserting that proactive individuals are more likely to translate EP into EI and use it as motivation to drive entrepreneurial activities.

Therefore, Highly proactive individuals are more inclined to convert EP, a positive emotion, into EI. Additionally, existing research has explored the moderating role of PP in the relationship between individual traits and EI (Schlaegel et al., 2021). For instance, Proactive individuals are more courageous and confident when facing entrepreneurial risks, thus showing a greater propensity to pursue entrepreneurial paths (Schlaegel et al., 2021). This moderating effect helps to understand how proactivity influences the process of transforming EP into EI. In summary, we propose the following hypothesis:

H3: PP may play a moderating role in the effect of EP on EI.

In summary, PET provides insights into the role of positive emotions in the entrepreneurial process, offering a useful framework for this study. Based on this theory, this study establishes a moderated mediation model (as illustrated in Figure 1), proposing that university students' PEE influences EI through EP, with PP moderating the latter part of this effect. In other words, EP mediates the relationship between university students' PEE and EI, while PP moderates the impact of EP on EI.

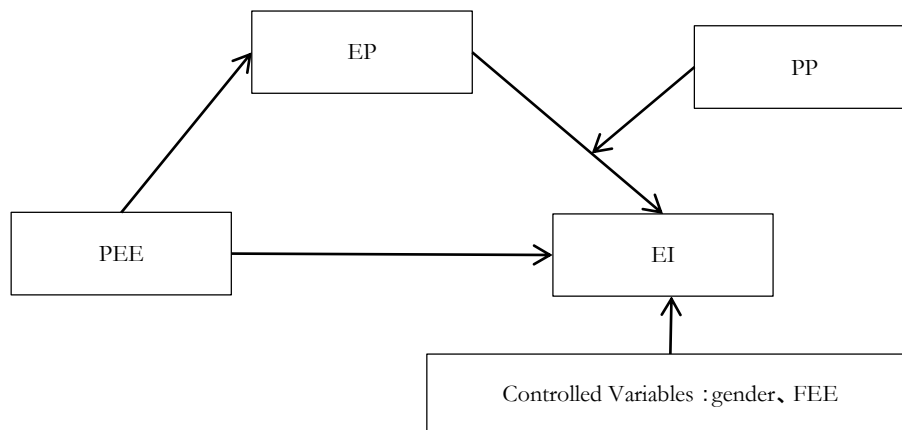


Figure 1: The theoretical research framework

NOTE:FEE means Family members have entrepreneurial experience.

2. METHODS

3.1 Participants and Procedures

Sudman (1976) noted that for research focused on a specific region, a sample size of 500 to 1000 is generally sufficient. Considering the potential presence of invalid responses, this study collected a total of 900 questionnaires. Zhejiang Province, a provincial-level administrative region in China, is currently immersed in an atmosphere of "mass entrepreneurship and innovation," with numerous incubators available (Ding Shuli, 2023). Universities in Zhejiang also have a strong entrepreneurial environment, featuring distinctive entrepreneurship courses and various related competitions (Lin & Zheng, 2022).

This study targets university students in Zhejiang Province and employs a two-stage sampling method. In the first stage, purposive sampling was used to select three representative cities from Zhejiang Province: Hangzhou, Ningbo, and Shaoxing. Hangzhou, the provincial capital, provided one university, while Ningbo and Shaoxing, representing economically and educationally significant cities, each provided one university. Each selected university was an "Innovation and Entrepreneurship Education Demonstration University" as recognized by China's Ministry of Education (2016, 2017). These universities are renowned for their exceptional performance in innovation and entrepreneurship education, and their students typically exhibit higher EI.

In the second stage, convenience sampling was employed to survey students from these three demonstration universities. The research team coordinated with the innovation and entrepreneurship guidance centers at the three universities to facilitate the survey. Trained researchers distributed online questionnaires via www.wjx.cn during students' class times, informing participants that their participation was voluntary and anonymous, with data protection in accordance with the Declaration of Helsinki (Goodyear et al., 2007). Students accessed the questionnaire through a QR code generated by the questionnaire platform and were assisted by teachers in completing the survey, which took approximately 20 minutes. During the process, students were instructed that there were no right or wrong answers, and they should respond honestly based on their own situations.

A total of 788 valid questionnaires were collected, yielding a response rate of 98.5%. The final sample consisted of 230 male and 558 female participants. Respondents were drawn from various academic years, with first-year students constituting 12.3%, second-year students 30.5%, third-year students 51.1%, and fourth-year students 6.2%. In terms of academic disciplines, 42.7% were enrolled in natural sciences, while 57.2% were majoring in humanities and social sciences. The sample comprised 47.5% only children and 52.5% non-only children. Regarding institutional types, 7.4% attended comprehensive universities, 71.6% were from general undergraduate institutions, and 21.1% were from higher vocational and technical colleges. Among the respondents, 42.9% had family members with entrepreneurial experience, whereas 57.1% did not.

3.2 Measure

3.2.1 Entrepreneurial Intention Scale (EIS)

This study utilized the revised EIS developed by Jena (2020). The scale employs a five-point Likert scale, where 1 denotes "strongly disagree" and 5 denotes "strongly agree," with higher scores indicating stronger EI. The scale comprises six items and has been validated as a reliable and effective measure for assessing EI among Chinese individuals (Zhang & Huang, 2021). The overall reliability of the EIS is 0.899, with all individual item reliabilities exceeding 0.700, indicating strong internal consistency and stability. The scale's fit indices are as follows: RMR = 0.076 and SRMR = 0.061, both below the threshold of 0.080; GFI = 0.888, NFI = 0.888, IFI = 0.891, CFI = 0.891, TLI = 0.818, and RFI = 0.814, all approaching 0.900; and PNFI = 0.533 and PGFI = 0.534, both exceeding 0.500. According to model fit criteria, these results demonstrate that the EI scale possesses good validity.

3.2.2 Perceived Entrepreneurial Education Scale (PEES)

This study employs the university entrepreneurial education scale developed by Triafrianty (2020). Utilizing a five-point Likert scale, the instrument assesses three dimensions: objectives, theory, and methods (e.g., "After attending the entrepreneurship course, I became more aware of the entrepreneurial environment"), with a total of 10 items. The overall score for all items reflects the level of perceived entrepreneurial education. Reliability analysis revealed that the Cronbach's Alpha coefficients were .849 for the "Objectives" dimension, .783 for the "Theory" dimension, and .901 for the "Methods" dimension, resulting in an overall Cronbach's Alpha of .939 for the scale. These values, all exceeding .700, indicate strong internal consistency and stability. Confirmatory factor analysis showed that RMR = 0.045 and SRMR = 0.045, both below the .080 threshold; NFI = 0.921, IFI = 0.926, and CFI = 0.926, all above .900; and PNFI = 0.665 and PGFI = 0.658, both greater than .500. Based on these model fit indices, the scale meets the fit criteria, indicating good validity of the university entrepreneurial education scale.

3.2.3 Entrepreneurial Passion Scale (EPS)

This study employs the EP measurement scale developed by Cardon et al. (2013). The scale is unidimensional and consists of five items. It utilizes a five-point Likert scale, where 1 represents

"strongly disagree" and 5 represents "strongly agree." An example item is, "I am motivated to think about how to improve existing products/services." The scale has been validated as a reliable and effective measure for assessing EP among Chinese individuals (Li et al., 2020). The scale's fit indices are as follows: RMR = 0.035 and SRMR = 0.034, both below the .080 threshold; GFI = 0.935, RFI = 0.908, TLI = 0.911, NFI = 0.954, IFI = 0.956, and CFI = 0.956, all exceeding .900. According to model fit criteria, these results indicate that the EPS possesses good validity. Additionally, the scale's overall reliability is 0.908, with all item reliabilities exceeding 0.700, demonstrating strong internal consistency and stability.

3.2.4 Proactive Personality Scale (PPS)

This study utilizes the 10-item PPS developed by Seibert et al. (1999), with items such as, "There is nothing more exciting than seeing my ideas come to life." The reduced 10-item PPS has been widely used and validated in past research (Gupta & Bhawe, 2007; Prabhu et al., 2012). The scale's overall reliability is 0.892, with all item reliabilities exceeding 0.700, indicating strong internal consistency and stability. The scale's fit indices are as follows: RMR = 0.038 and SRMR = 0.045, both below the .080 threshold; GFI = 0.949, RFI = 0.913, TLI = 0.922, NFI = 0.950, IFI = 0.955, and CFI = 0.955, all exceeding .900; and PNFI = 0.549 and PGFI = 0.552, both above .500. These fit indices indicate that the PPS has good validity according to model fit criteria.

3.3 DATA ANALYSIS

In this study, common method bias (CMB) was assessed using Harman's Single-Factor Test and Confirmatory Factor Analysis (CFA) comparison methods (Tang & Wen, 2020). An exploratory factor analysis was conducted on all items of the formal questionnaire scale. The results revealed 12 factors with eigenvalues greater than 1, accounting for a cumulative variance of 75.916%. The first factor explained 42.411% of the total variance, which is less than 50%, indicating that common method bias in the formal questionnaire data is not severe.

Additionally, a single-factor model was compared with a theoretical CFA model with fully correlated factors, which is a six-factor model. The comparison involved examining the differences in degrees of freedom and chi-square values between the two models to determine if the differences were significant, along with evaluating various fit indices. The data revealed a difference in chi-square ($\Delta\chi^2 = 5,741.79$), degrees of freedom ($\Delta df = 15$), with $p < .050$. The single-factor model showed a poorer fit compared to the multi-factor model and reached a significant level, indicating that the CMB issue is not severe and can be considered acceptable.

3. RESULTS

4.1 Descriptive Statistics and Correlation Analysis

The data from the 788 validated questionnaire responses were analyzed using descriptive statistics to determine the mean and standard deviation for the total scores on the four scales: Perceived Entrepreneurial Education, EI, EP, and PP. The mean scores were as follows: Perceived Entrepreneurial Education (M = 3.292, SD = 0.816), EI (M = 3.045, SD = 0.899), EP (M = 3.414, SD = 0.871), and PP (M = 3.485, SD = 0.654). Given that all scales use a five-point rating system, these results indicate that college students' PEE, EI, EP, and PP were all at a moderate to high level.

The results of the correlation analysis among Perceived Entrepreneurial Education, EI, EP, and PP are presented in Table 1. The Pearson correlation coefficients between variables ranged from 0.419 to 0.721, with all correlations being statistically significant ($p < 0.05$). All variables exhibited significant positive correlations, with correlation coefficients below 0.800, suggesting minimal multicollinearity issues (Wu, 2010). Additionally, the correlation coefficients were all less than the square root of the Average Variance Extracted (AVE) for each variable (Hair et al., 1998), indicating good discriminant validity and a well-structured questionnaire.

Table 1. Summary table of descriptive statistics and correlation analysis

Variable	<i>M</i>	<i>SD</i>	1	2	3	4
PEE	3.292	0.816	0.803			
EI	3.045	0.899	.419***	0.78		
EP	3.414	0.871	.461***	.604***	0.822	
PP	3.485	0.654	.505***	.572***	.721***	0.748

Note. Bolded fonts are AVE root values; *** $p < .001$

4.2 Analysis of the Mediating Effects of EP

This study employed Model 4 of the PROCESS macro to analyze the mediating effect of EP. While controlling for gender and whether family members have entrepreneurial experience, the analysis was conducted with PEE as the independent variable, EP as the mediator, and EI as the dependent variable. The results of the model are presented in Table 2. As shown in Table 2, Model 1 demonstrates that PEE significantly and positively predicts EI ($B = 0.468$, $p < 0.001$), thus supporting Hypothesis 1. In Model 2, PEE also significantly and positively predicts EP ($B = 0.485$, $p < 0.001$). Model 3 includes the mediator variable, revealing that EP significantly and positively predicts EI ($B = 0.531$, $p < 0.001$), while PEE continues to significantly and positively predict EI ($B = 0.21$, $p < 0.001$). This indicates that EP partially mediates the relationship between PEE and EI. Therefore, Hypothesis 2 is supported.

Table 2 Mediation analysis

Variables	EI (Model 1)		EP (Model 2)		EI (Model 3)	
	<i>B</i>	<i>t</i>	<i>B</i>	<i>t</i>	<i>B</i>	<i>t</i>
FEE	0.387	6.64***	0.234	4.254***	0.263	5.148***
Gender	0.124	1.948	0.398	6.653***	-0.088	-1.549
PEE	0.468	13.445***	0.485	14.794***	0.21	6.168***
EP					0.531	16.167***
R^2	0.22		0.264		0.415	
F	73.861***		93.507***		139.139***	

NOTE: *** $p < 0.001$. FEE means Family members have entrepreneurial experience.

The mediating effect of EP was reassessed using the nonparametric percentile bootstrap method. The results showed that the indirect effect of PEE on EI was 0.258, with a 95% confidence interval (CI) of LLCI = 0.207 and ULCI = 0.310, which does not include zero, indicating a significant mediation effect. The direct effect was 0.21, with a 95% confidence interval (CI) of LLCI = 0.143 and ULCI = 0.277, which also does not include zero, indicating that EP has a partial mediating effect. The direct effect and the mediating effect accounted for 44.87% and 55.13% of the total effect, respectively (see Table 3). Thus, Hypothesis 2 is again supported.

Table 3 Total, Direct and Indirect Effects among Variables

	Effect size	Boot SE	Boot CI	Relative effect size

Total effect	0.468	0.035	0.4, 0.536	-
Direct effect	0.21	0.034	0.143, 0.277	44.87%
Indirect effect	0.258	0.026	0.207, 0.31	55.13%
*p<0.05; **p<0.01; ***p<0.001.				

4.4 A Moderated Mediation Model

To examine whether PP moderates the latter part of the mediation model, this study employed Model 14 of the PROCESS macro for testing. As shown in Table 4, with controls for gender and whether family members have entrepreneurial experience, Model 1 indicates a significant positive effect of PEE on EP (B = 0.485, p < 0.001). In Model 2, PEE significantly and positively predicts EI (B = 0.114, p < 0.001), EP significantly predicts EI (B = 0.406, p < 0.001), and PP also significantly predicts EI (B = 0.326, p < 0.001). Furthermore, PP moderates the effect of EP on EI (B = 0.185, p < 0.001), thus supporting Hypothesis 3. Additionally, the bias-corrected nonparametric percentile bootstrap method was used to test the moderated mediation effect. The moderated mediation index (INDEX) was 0.09, with a confidence interval not including zero (0.048, 0.133), further validating the significance of the moderated mediation effect (Hayes, 2015).

Table 4 Conditional Process Analysis

Variables	EP (Model 1)				EI (Model 2)			
	B	SE	t	95% CI	B	SE	t	95% CI
FEE	0.234	0.055	4.254	[0.126, 0.341]	0.244	0.049	4.958	[0.147, 0.341]
Gender	0.398	0.06	6.653	[0.281, 0.515]	-0.114	0.055	-2.084	[-0.221, 0.007]
PEE	0.485	0.033	14.794	[0.421, 0.549]	0.114	0.035	3.251	[0.045, 0.182]
EP					0.406	0.041	9.964	[0.326, 0.486]
PP					0.326	0.054	5.997	[0.219, 0.432]
EP*EE					0.185	0.035	5.333	[0.117, 0.254]
R ²	0.264				0.46			
F	93.507***				110.74***			

NOTE: ***p<0.001. FEE means Family members have entrepreneurial experience

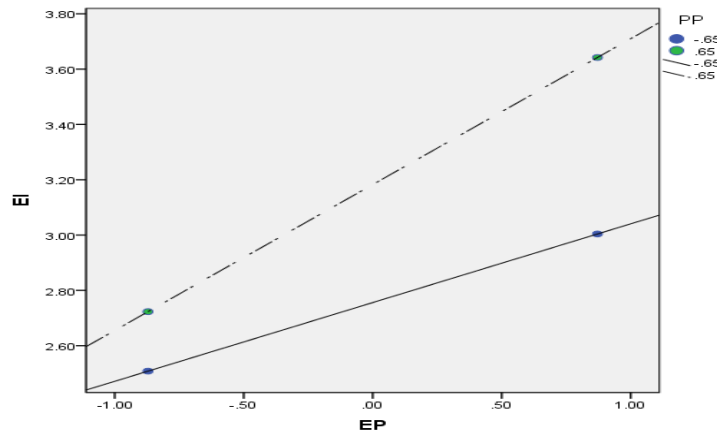


Figure 2 The Moderating Effect of PP in the Influence of EP on EI

Note: Low PP is the solid line, High PP is the dashed line.

To further investigate how PP moderates the impact of EP on EI, a simple slope analysis was conducted, and a moderation effect graph was created. Figure 2 illustrates the moderation effect using simple slope analysis, showing the impact of EP on EI at high ($M + 1\text{ SD}$) and low ($M - 1\text{ SD}$) levels of PP.

In the graph, the solid line represents the slope for the effect of EP on EI at low PP ($M - 1\text{ SD}$), while the dashed line represents the slope at high PP ($M + 1\text{ SD}$). The results indicate that, under high EP, the effect on EI is stronger for individuals with high PP compared to those with low PP. This suggests that PP positively strengthens the relationship between EP and EI. As shown in Figure 2, the impact of EP on EI is more pronounced for students with high PP than for those with low PP.

5 DISCUSSION

The results of this study indicate that PEE has a significant positive effect on EI, thereby supporting Hypothesis 1. These findings are consistent with previous research (Imran et al., 2021). Several factors can explain why perceived entrepreneurial education significantly influences EI: First, EE in universities typically provides systematic training in entrepreneurial knowledge and skills, including business plan development, market analysis, financing strategies, and team management (Byrne et al., 2014). Through such courses, students acquire essential knowledge and practical skills necessary for entrepreneurship, which enhances their confidence and capabilities, subsequently increasing their EI (Byrne et al., 2014). Second, EE helps students strengthen their self-efficacy, or belief in their ability to succeed in entrepreneurship (Yeh et al., 2021). University-based entrepreneurial courses, internships, and business simulation activities provide students with firsthand experiences that build their confidence in their entrepreneurial abilities (Yeh et al., 2021). Third, EE not only imparts technical skills but also emphasizes entrepreneurial spirit, innovative thinking, and risk management (Ferreira et al., 2017). This educational approach can influence students' entrepreneurial attitudes, leading them to view entrepreneurship as an attractive career choice (Packham et al., 2010). Positive entrepreneurial attitudes directly foster the formation of EI (Packham et al., 2010).

The results of this study indicate that EP mediates the relationship between PEE and EI, thereby supporting Hypothesis 2. This finding is consistent with previous research (Neneh, 2022). The mediating role of EP in the relationship between PEE and EI can be analyzed from the following perspectives: First, EP can stimulate latent intrinsic motivation (Galindo-Martín et al., 2023). EE not only directly impacts students' entrepreneurial knowledge and skills but also indirectly enhances their EI by fostering EP (Galindo-Martín et al., 2023). The passion experienced during EE encourages students to actively consider entrepreneurship and view it as a viable career option (Galindo-Martín et al., 2023). Second, according to PET, EP has an emotional reinforcing effect (Fredrickson, 2001). The rational insights and skills gained from EE are reinforced through the emotional component of EP (Cardon et al., 2005). This emotional reinforcement leads students to not only recognize entrepreneurship as feasible on a rational level but also to desire emotional involvement in entrepreneurship, further enhancing their EI (Cardon et al., 2005). Finally, EP can enhance cultural identity and self-construction (Cardon et al., 2005). When students perceive the importance of entrepreneurship through education and develop EP, they may begin to view entrepreneurship as a part of their identity. This identification with entrepreneurship further drives their EI (Cardon et al., 2005).

The results of this study reveal that PP moderates the relationship between EP and EI, thereby supporting Hypothesis 3. This finding is consistent with previous research (Li et al., 2020). The moderating effect of PP on the relationship between EP and EI may be due to several reasons. Students with a PP are typically more action-oriented, prefer to control their environment, and are more inclined to take initiative when faced with opportunities or challenges, rather than waiting

passively or relying on external stimuli (Kiani et al., 2023). For students with strong EP, a PP enhances their ability to translate this passion into concrete actions (Li et al., 2020). In other words, students with a PP are more likely to take proactive steps to achieve their entrepreneurial goals, thereby increasing their EI. Additionally, a PP is often associated with strong problem-solving and innovative capabilities. Given the uncertainty and challenges inherent in entrepreneurship, students with a PP are better able to actively seek solutions and adapt flexibly to various changes during the entrepreneurial process, driven by their EP (Kiani et al., 2023). This ability not only strengthens their EI but also boosts their confidence in achieving entrepreneurial success (Kiani et al., 2023). Entrepreneurship is a long-term and challenging endeavor, where mere passion may not suffice to sustain the entire process. A PP helps students maintain their drive and determination based on their EP, even in the face of difficulties, thus enhancing their EI (Kiani et al., 2023).

5. RESEARCH CONTRIBUTIONS

5.1 Theoretical Contributions

Firstly, this study is the first to examine EP as a mediating variable, exploring its role in the relationship between perceived entrepreneurial education and EI among university students. This enriches the existing theoretical perspectives on entrepreneurial education. Additionally, by introducing PP as a moderating variable, the study investigates how individual personality traits influence the relationship between EP and EI. This provides a new framework and insights for research in entrepreneurial education theory. This integrative research framework facilitates a more comprehensive understanding of the mechanisms through which entrepreneurial education impacts EI, particularly how EP operates through individual personality traits to foster EI.

Secondly, the study highlights the critical role of EP in the effectiveness of entrepreneurial education, expanding the theoretical application of EP. By positioning EP as a bridge between education and behavior, this research offers new empirical support for the significance of EP in entrepreneurial behavior. This theoretical extension deepens the understanding of EP, revealing it not merely as an emotional response but as a significant motivational force driving the formation of EI.

Lastly, by analyzing the moderating effect of PP on the relationship between EP and EI, this study refines the understanding of how personality traits specifically impact the entrepreneurial process. This finding establishes a closer connection between personality psychology and entrepreneurial behavior research, enriching the theoretical discussion on how individual differences affect the entrepreneurial process. This contribution provides new research pathways for future studies, especially in exploring how different personality traits influence entrepreneurial decisions and behavior, and holds important theoretical significance.

5.2 Practical Contributions

Firstly, this study empirically demonstrates the significant impact of entrepreneurial education on students' EI and reveals the mediating role of EP in this process. This finding provides scientific evidence for universities in designing and implementing entrepreneurial education programs. It clarifies that entrepreneurial education should not only focus on knowledge transfer but also aim to stimulate and cultivate students' EP. Universities can use these insights to optimize their entrepreneurial education curricula, enhancing both emotional and motivational aspects of the courses to better help students translate acquired knowledge into actual EI.

Secondly, the study indicates that PP moderates the relationship between EP and EI. This finding suggests that universities should consider individual differences, particularly personality traits, when implementing entrepreneurial education. Tailoring education strategies to individual differences can maximize educational outcomes. Universities might offer personalized counseling

and support, designing targeted learning and practical programs for students with varying personality traits, thereby enhancing their EI and success rates.

Lastly, the study underscores the importance of EP and suggests that universities should incorporate more practical and experiential elements into their entrepreneurial education, such as internships, project incubation, and company visits. By enhancing the practical aspects of entrepreneurial education, students can better integrate theory with practice, thereby stimulating their EP. This approach improves the overall effectiveness of entrepreneurial education and boosts students' EI.

6. CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH DIRECTIONS

This study, grounded in positive emotions theory, proposes and validates a moderated mediation model. It finds that perceived entrepreneurial education significantly and positively affects EI among university students. EP partially mediates the relationship between perceived entrepreneurial education and EI. Furthermore, students' PP moderates the latter part of this model. These findings contribute to the knowledge base in entrepreneurial education. However, several limitations remain, and future research should address them.

Firstly, the measurement of all variables in this study primarily relies on self-reported questionnaires completed by students. While statistical results indicate no significant common method bias, it cannot be completely ruled out. Future research should use multidimensional measurement tools to assess variables such as EP and PP. For example, combining quantitative surveys with qualitative interviews could provide more comprehensive and accurate data.

Secondly, this study focuses on universities in Zhejiang Province, China, which may limit the generalizability and external validity of the findings. Entrepreneurial education implementation and student characteristics might vary across different regions and institutions, potentially affecting the applicability of the results. Future research should expand the sample to include universities from various regions and types. Cross-regional and cross-institutional studies could enhance the generalizability and external validity of the findings.

Lastly, this study utilizes cross-sectional data, which means that it can only analyze entrepreneurial education perceptions, EP, and EI at a single point in time. Cross-sectional data cannot reveal causal relationships between these variables or observe changes over time. Future research should employ longitudinal study designs to track long-term changes in students after receiving entrepreneurial education and observe how EP and EI evolve over time.

Declarations

Financing

None

Conflicts of interest/Competing interests

None

Availability of data and material

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request

Code availability

Not applicable

Authors' contributions

JZ designed the study, analyzed the data, and drafted the manuscript. HPW is the supervisor who has guided the writing of this paper.

Ethics approval

Before beginning the study, approval was obtained from the Ethical Committee for Noninvasive Studies.

Consent to participate (include appropriate statements)

The purpose of the study was explained to the students, and the students who agreed to voluntarily participate in the research were included in the study. Moreover, informed consent was obtained from the students.

Acknowledgments:

We thank all the participants in this study.

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