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Will transformational leadership still affect the entrepreneurial intentions of higher vocational college students after COVID-19? Moderating role of perceived creativity and economic confidence

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Abstract
The study aims to identify the influence factors on Chinese higher vocational college students' entrepreneurial intention after coronavirus disease 2019 (COVID-19). The research uses the partial least squares structural equation modeling (PLS-SEM) method to analyze the data. Findings show entrepreneurial mentors' transformational leadership and education and training positively influence entrepreneurial intention, with entrepreneurial attitude mediating this relationship, while perceived creativity and economic confidence moderate the entrepreneurial attitude and entrepreneurial intention. This study adds to the literature by highlighting the effect of transformational leadership and provides pioneering evidence on perceived creativity and economic confidence's moderating effects after COVID-19.

Keywords Transformational leadership · Education and training · Perceived creativity

Résumé
L'étude vise à identifier les facteurs d'influence sur l'intention entrepreneuriale des étudiants des collèges professionnels supérieurs chinois après le COVID-19. La recherche utilise la méthode PLS-SEM pour analyser les données. Les résultats montrent que le leadership transformationnel des mentors entrepreneuriaux et l'éducation et la formation influencent positivement l'intention entrepreneuriale, avec l'attitude entrepreneuriale qui médie cette relation, tandis que la créativité perçue et la confiance économique modèrent l'attitude entrepreneuriale et l'intention entrepreneuriale.

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Cette étude ajoute à la littérature en soulignant l'effet du leadership transformationnel et fournit des preuves pionnières sur les effets modérateurs de la créativité perçue et de la confiance économique après le COVID-19.

Zusammenfassung
Die Studie zielt darauf ab, die Einflussfaktoren auf die unternehmerische Absicht von Studenten an chinesischen Hochschulen für höhere Berufsbildung nach COVID-19 zu identifizieren. Die Forschung verwendet die PLS-SEM-Methode zur Analyse der Daten. Die Ergebnisse zeigen, dass die transformationale Führung und Bildung und Ausbildung von unternehmerischen Mentoren die unternehmerische Absicht positiv beeinflussen, wobei die unternehmerische Einstellung diese Beziehung vermittelt, während wahrgenommene Kreativität und wirtschaftliches Vertrauen die unternehmerische Einstellung und unternehmerische Absicht moderieren. Diese Studie ergänzt die Literatur durch die Hervorhebung der Wirkung transformationaler Führung und liefert bahnbrechende Beweise für die moderierenden Effekte von wahrgenommener Kreativität und wirtschaftlichem Vertrauen nach COVID-19.

Resumen
El estudio tiene como objetivo identificar los factores de influencia en la intención emprendedora de los estudiantes de colegios vocacionales superiores chinos después del COVID-19. La investigación utiliza el método PLS-SEM para analizar los datos. Los hallazgos muestran que el liderazgo transformacional de los mentores emprendedores y la educación y formación influyen positivamente en la intención emprendedora, con la actitud emprendedora mediando en esta relación, mientras que la creatividad percibida y la confianza económica moderan la actitud emprendedora y la intención emprendedora. Este estudio contribuye a la literatura destacando el efecto del liderazgo transformacional y proporciona evidencia pionera sobre los efectos moderadores de la creatividad percibida y la confianza económica después del COVID-19.

Introduction

Given the quick evolution of the Internet, entrepreneurship has gained widespread attention worldwide (Anjum et al., 2021; Sesen, 2013). "Mass entrepreneurship and innovation" has been put forward by China to promote and inspire college students to initiate entrepreneurial endeavors. Meanwhile, educational institutions promote college students' entrepreneurship by organizing various forms of entrepreneurship education and competitions (Li & Wu, 2019). As the most reliable indicator of entrepreneurial action (Carsrud & Brännback, 2011; Krueger et al., 2000), entrepreneurial intention (EI) significantly influenced individual entrepreneurial decision-making (Nabi et al., 2010; Wu et al., 2022). However, the EI of Chinese college students is still very low, and few people truly participate in entrepreneurship after graduation, especially after coronavirus disease 2019 (COVID-19). A survey on the EI of college students in Henan showed that only 3.6% of graduates have EI (Dong

et al., 2021). Research conducted on collegiate entrepreneurship within Fujian Province showed a lower average EI, indicating a general decrease in EI (Huang & Liu, 2022). The conclusion has also been supported in studies from other provinces (Zhong et al., 2021; Zhu & Yue, 2021).

College students' EI has become a hot topic in academic research (Udayanan, 2019). It mainly focuses on influencing factors such as school support, social networks, self-efficacy, and demographic factors (e.g., Alshebami, 2022; Anjum et al., 2021; Shah et al., 2020). The Theory of Planned Behavior was used to examine the effect of attitudes, perceived behavioral control, and subjective norms on college students' EI (e.g., Moriano et al., 2012; Vodă & Florea, 2019). From this, it becomes evident that research on the EI of college students mainly starts from the perspectives of school, society, environment, and personality to study the impact of different subjects on it.

However, during the economic slowdown after COVID-19, people's consumption concepts, lifestyles, and psychological states have all undergone various changes (Altig et al., 2020; Yao, 2022), and college students have become more cautious about starting a business. Therefore, it is worth investigating whether college students' confidence in the economy can affect their entrepreneurial intentions. Meanwhile, existing research has neglected to consider the role of entrepreneurial mentors. Actually, as the group closest to entrepreneurial students, entrepreneurial mentors play an essential part in college students' entrepreneurial attitude (EA) and intention (Bagheri et al., 2013). Entrepreneurial mentors provide them with various guidance, training, and assistance, and their leadership style crucially stimulates college students' EI (Fauzi et al., 2021; Jauhari et al., 2017). Faloye and Olatunji (2018) also stated that entrepreneurial mentors influence participants' EI. However, little research has been found to link EI with entrepreneurial mentors' transformational leadership (TL; Rashid & Halim, 2014). The literature on educational leadership pointed out that educational leaders require entrepreneurial skills but have not focused on the TL style required to change attitudes (Arifin & Gunawan, 2020). A more critical point is that there are few studies on the EI of students in higher vocational colleges.

To bridge the gap, this paper examines the interrelationships between the role of entrepreneurial mentors [TL and education and training (ET)] and higher vocational college students' EA and EI. Another study goal is to examine the role of higher vocational college students' perceived creativity (PC) and economic confidence (EC) between EA and EI. To obtain these goals, the following questions need to be addressed: (1) Can the TL and ET of entrepreneurial mentors improve higher vocational college students' EA? (2) Does EA mediate between entrepreneurial mentors' TL, ET, and EI? (3) Does the EA of higher vocational college students affect their EI? (4) Does the EC and PC of higher vocational college students have a moderating effect between the EA and EI?

This study delves into the EI among higher vocational college students after COVID-19, constructing a novel research model to elucidate the role of entrepreneurial mentors' TL and ET on students' EA and EI. Secondly, it examines the moderating role of EC and PC within this framework. The study further enriches the research system of EI, contributes to playing the role of entrepreneurial mentors' TL

and reveals the crucial role of entrepreneurial attitudes and cognitive factors in the formation of entrepreneurial intention, underscoring the necessity of policymakers fortifying economic confidence among higher vocational college students. Consequently, it is pivotal in addressing societal employment conflicts and enhancing the prevailing employment landscape for college students amidst an intensely competitive environment.

Literature review and hypotheses

Transformational leadership and entrepreneurial attitude

The TL has been acknowledged as a substantial driver of innovation (Rashid et al., 2014). Burns (2012) first proposed the concept of TL in his work *Leadership*. Bass (1985) further developed this concept, pointing out that TL is a leadership style characterized by a leader's ability to ignite enthusiasm among followers, encourage and motivate them to achieve their personal goals better, and achieve results exceeding initial expectations (Fauzi et al., 2021). Many researchers believe that teacher leadership in education is entirely consistent with the characteristics of TL (Beachum & Dentith, 2004; Pounder, 2006). Therefore, within the context of innovation and entrepreneurship among college students, TL in this study refers to the leadership style of entrepreneurial mentors.

Entrepreneurial mentors, as transformational leaders, have characteristics that can influence college student innovation behavior (Lee et al., 2013). They can influence students beyond self-interest through their influence, demonstration, support, care, intellectual stimulation, or personalized thinking (Rashid & Halim, 2014). It enhances students' perception and understanding of entrepreneurship, enhancing their focus on entrepreneurial achievements, self-actualization, and social well-being (Murphy & Anderson, 2020). The result is that students trust and admire them as followers, stimulate motivation to actively participate, engage in personalized thinking, and improve self-efficacy and satisfaction (Barroso Castro et al., 2008; Hetland et al., 2015; Thomas et al., 2020).

The TL significantly impacts followers' work attitudes and behavior (Barroso Castro et al., 2008). Previous studies have verified this conclusion. For instance, Lan and Chong (2015) delved into the correlation between TL and employees' work attitudes, revealing a noteworthy impact of TL on employees' work attitudes. Lee et al. (2013) examined how the TL style influenced individuals' attitudes and intentions to follow safe food handling practices, confirming TL's constructive role in enhancing attitudes and intentions. Additionally, Cheng (1994) examined the impact of teacher leadership on students' emotional performance, including self-efficacy and attitudes toward schools, teachers, and peers. Apart from the above benefits, if transformational teacher leaders can enhance students' creativity and moral behavior, as shown in research on corporate leadership literature, the impact on teacher leadership will be significant (Pounder, 2006). However, extensive research was lacking on the application of TL by teachers within entrepreneurial environments and their

attitudes toward students' entrepreneurial endeavors. Hence, this study hypothesizes that:

H1 The TL of entrepreneurial mentors significantly influences the EA of higher vocational college students.

Education and training and entrepreneurial attitude

The ET promotes entrepreneurship (Drucker, 1985). Recently, Chinese educational institutions have attached great importance to entrepreneurial ET. Entrepreneurial ET refers to courses and activities to enhance entrepreneurial knowledge and skills (Mei et al., 2020). Entrepreneurial ET notably amplifies college students' grasp of business knowledge and entrepreneurial prowess (Laguna-Sánchez et al., 2020), fostering creativity and instilling an entrepreneurial mindset (Pardo-García & Barac, 2020). Concurrently, it equips students with entrepreneurial resources and the insight to identify business prospects. Proficiency in entrepreneurial skills serves to kindle their entrepreneurial zeal (Liu et al., 2019), mitigate apprehensions of entrepreneurial risks, and reshape their perceptions of entrepreneurship (Rauch & Hulsink, 2015).

Previous research suggests that entrepreneurial ET could enhance EA. For example, Lundström and Stevenson (2005) obtained that entrepreneurship ET has a favorable impact on individuals' attitudes and intentions toward engaging in entrepreneurial activities. Through tracking research on university entrepreneurship courses, entrepreneurship education can strengthen entrepreneurial identity and stimulate entrepreneurial enthusiasm (Donnellon et al., 2014). Li and Wu (2019) also verified that entrepreneurship education can transform college students' attitudes and generate entrepreneurial passion. Youssef et al. (2021) studied students across two Kosovo universities, revealing that entrepreneurship education support can change individual attitudes toward entrepreneurship. Liu et al. (2019) reached consistent results in their empirical study.

Therefore, this article considers good ET to be able to help improve entrepreneurial skills, stimulate entrepreneurial enthusiasm, and cultivate a proactive EA (Wu et al., 2022). Consequently, the following hypothesis is proposed:

H2 The ET of entrepreneurial mentors significantly influences the EA of higher vocational college students.

Entrepreneurial attitude and entrepreneurial intention

The EI has been identified as a fundamental trait for aspiring entrepreneurs (Premalatha, 2010). The Theory of Planned Behavior states individuals' attitudes will influence their ultimate behavioral intention (Ajzen, 2002). This theory elucidates the connection between attitude, intention, and planned behavior. Furthermore, it has also been validated in the entrepreneurial field (Liñán & Chen, 2009).

An EA tends to react on the basis of entrepreneurial preferences (Kusmintarti et al., 2017). It has been regarded as a variable and predictable entrepreneurial idea and emotion (Wyk et al., 2003). Additionally, EI is a state of consciousness in which an individual intends to begin a business consciously (Hsu et al., 2019). Expected value theory suggests that attitudes are positively related to the product of behavioral beliefs and outcome evaluations (Liu et al., 2019). As supported by Ajzen (2002), individuals tend to exhibit a stronger inclination toward action when they perceive that their actions can yield favorable outcomes, consequently fostering the intention to engage in those actions. In the same way, an EA contributes to generating EI (Soomro et al., 2021).

Prior literature indicated a positive association between EA and EI. Mahfud et al. (2020) validated EA's notable and constructive impact on EI among Indonesian polytechnic students, and, similarly, among students in Saudi Arabia (Aliedan et al., 2022). These findings align with other scholars' conclusions that have underscored the positive and substantial relationship between EI and EA across cultures (Liñán & Chen, 2009; Ozaralli & Rivenburgh, 2016) and populations (Atitsogbe et al., 2021). Therefore, the hypothesis is proposed as follows:

H3 The EA of higher vocational college students significantly influences their EI.

The mediating role of entrepreneurial attitude

Entrepreneurial mentors cannot be ignored. As direct entrepreneurial leaders, entrepreneurial mentors who adopt TL will make college students trust and admire them (Lee et al., 2013). TL significantly impact followers' attitude and behavior (Ehrnrooth et al., 2021). TL can stimulate college students' entrepreneurial motivation and encourage them to solve problems personally (Lan & Zhong, 2015). Also, entrepreneurial mentors with TL will empower entrepreneurial college students and encourage them to independently complete various tasks (Abun et al., 2020; Burns, 2012). This kind of leadership will enhance their self-efficacy and positive beliefs in entrepreneurial behavior (Murphy & Anderson, 2020), thereby changing their entrepreneurial attitude (Hetland et al., 2015; Thomas et al., 2020), ultimately enhancing their EI. It can be seen that TL promotes a positive EA among college students, thereby enhancing their EI. The EA among college students plays a crucial connecting role in this process.

In addition, literature has demonstrated the mediating role of EA between ET and EI (Mahendra et al., 2017; Yousaf et al., 2021). Entrepreneurial education is the most important method for improving entrepreneurial skills (Farny et al., 2019). Students can gain business experience through entrepreneurial learning and practice, improving their self-efficacy and EA (Soomro et al., 2021; Youssef et al., 2021). A positive attitude can, in turn, affect college students' EI (Mahfud et al., 2020; Zovko et al., 2020). It can be seen that an EA is also an essential link between ET and EI. Therefore, two hypotheses were proposed:

H4 The EA positively mediates the relationship between the TL and EI.

H5 The EA positively mediates the relationship between the ET and EI.

The moderating role of perceived creativity

The PC is the level at which individuals believe they will produce novel and possibly valuable ideas regarding products, services, or procedures within their professional domain (Zhou et al., 2008). Creativity is a vital trait of becoming an entrepreneur (Laguía et al., 2019). In essence, entrepreneurship is a creative activity, and college students' creativity is crucial for entrepreneurship results (Kumar & Shukla, 2022).

Many scholars verified the effect of PC on EI. For instance, Laguía et al. (2019) surveyed college students in Spain and found that PC can promote EI. Data from China also proved that an entrepreneurial mindset and PC positively impact EI (Jiatong et al., 2021). Besides, Abdelfattah et al. (2022) investigated Oman entrepreneurs and verified the notable effect of PC on electronic entrepreneurial intentions.

Furthermore, Kusmintarti et al. (2017) and Zampetakis et al. (2009) obtained that PC can promote EA and EI. Actually, a positive and proactive EA among college students will promote EI (Aliedan et al., 2022; Mahfud et al., 2020). If college students perceive their creativity as high, their EI may become stronger (Abdelfattah et al., 2022). In contrast, when college students have low PC, they may believe themselves as not in line with entrepreneurial traits, and this may instead hinder their choice of entrepreneurship (Rodrigues et al., 2019). Consequently, the researchers believe that PC strengthens attitude's effect on EI and put forward the following hypothesis:

H6 The PC moderates the relationship between EA and EI of higher vocational college students.

The moderating role of economic confidence

Economic confidence, as a psychological state, reflects an individual's trust and expectations in the economic environment (Gil-Soto et al., 2022). EA reflects an individual's views and emotional tendencies toward entrepreneurial activities, while EI refers to an individual's tendency to engage in entrepreneurial activities. According to Ajzen (2002), an individual's behavioral intentions are affected by their attitudes, subjective norms, and perceived behavioral control. Within this framework, economic confidence can be viewed as a factor affecting individuals' perceived behavioral control, indirectly affecting entrepreneurial intentions. Individuals with higher economic confidence may feel greater control and likelihood of success, enhancing their EI.

Crecente-Romero et al. (2019) maintained that a good economic environment positively impacts entrepreneurial activities, and macroeconomic environmental conditions promote necessary entrepreneurship. In addition, improving the economic environment can enhance the perception of support that potential young

entrepreneurs in Spain's feel they have from close people and their confidence in their entrepreneurial abilities (Gil-Soto et al., 2022).

Although few studies directly explore the moderating role that economic confidence plays between EA and EI, according to the above analysis, EC, as an individual's confidence in economic development and prospects, can affect an individual's perception of the economic environment and their EA and EI. Therefore, the following hypothesis is proposed:

H7 The EC moderates the relationship between EA and EI of higher vocational college students.

On the basis of the literature review and hypotheses, a research model is proposed in Figure 1.

Methodology

Participants

This study utilized partial least squares structural equation modelling to examine the hypotheses. A minimum sample size of 107 was determined using G-Power, considering an effect size of 0.15 and a significance power of 0.95 (Kang, 2021). The prerequisites that respondents must have entrepreneurial mentors and receive entrepreneurial ET are necessary so that the researchers can infer the impact of the mentors on student entrepreneurship. A total of 350 Chinese higher vocational college students participated in this study. Of these, 301 completed the questionnaire, and after deleting the invalid questionnaires, there were still 271 cases left. Males (n = 136; 50.2%) and females (n = 135; 49.8%) were roughly equally represented among all respondents. Age groups were as follows: 19.9% less than or equal to 18 years of age, 32.8% 19 years of age, 22.5% 20 years of age, and 24.7% more than or equal to 21 years of age. Students studying science and engineering accounted for 61.3% (n = 166), and 105 students (38.7%) studied humanities and social sciences.

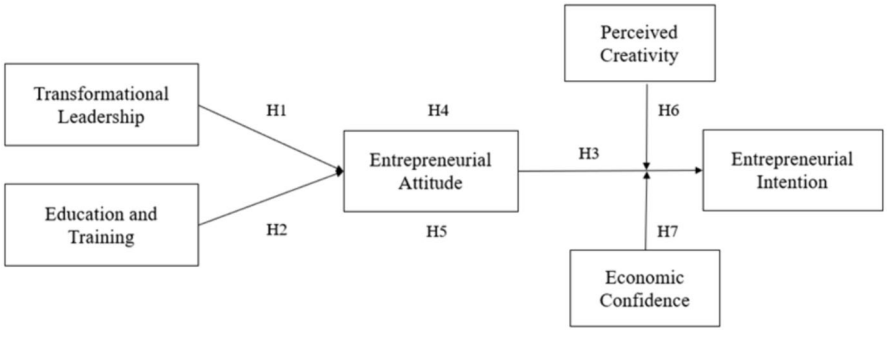

Figure 1 Research framework in this study

Meanwhile, among the 271 participants, 126 were third-year students, followed by first-year students (n = 67; 24.7%), second-year students (n = 58; 21.4%), and fourth-year students (n = 20; 7.4%). Furthermore, five continuous variables were measured, including TL [mean (M) = 3.64, standard deviation (SD) = 1.08], entrepreneurial ET (M = 3.66, SD = 1.04), EA (M = 3.68, SD = 1.07), EI (M = 3.66, SD = 1.04), EC (M = 3.64, SD = 1.05), and PC (M = 3.63, SD = 1.08).

Measures

The questionnaire consists of seven parts, including demographic information (gender, age, grade, and major), TL, ET, EA, EI, PC, and EC, with 38 items. The Likert five-point scale method, from 1 (strongly disagree) to 5 (strongly agree), was used to test all items except for demographic information.

Transformational leadership was measured with five items adapted from Alrowwad et al. (2020; e.g., "Entrepreneurial mentor encourages me to think about problems from a new perspective"). Respondents were asked to answer regarding their views on the practices and impact of entrepreneurial mentors in transformational leadership.

This study adapted the scale of Soomro and Shah (2022) to measure ET (six items). Respondents were asked to assess entrepreneurial mentors' ET, including the impact of ET on their entrepreneurial preparation and ability improvement [e.g., "ET enabled me to identify the characteristics of successful entrepreneurs (e.g., risk-taking, positivity, innovation" and "ET enabled me to acquire the knowledge and skills required to start a business."]

A five-item scale measured respondents' exposure to EA developed by Barba-Sánchez et al. (2022). Sample items included: "The idea of becoming an entrepreneur appeals to me" and "I would be happy to be an entrepreneur." These questions were designed to assess the respondents' attitudes toward entrepreneurship.

Entrepreneurial intention was measured with a six-item scale developed by Jiatong et al. (2021). Participants were asked to assess their EI, including their determination, goals, and effort levels. Sample items included: "I have a strong intention to start a business someday" and "I am ready to do anything to be an entrepreneur."

A six-item scale adapted from Abdelfattah et al. (2022) was used to measure PC. The respondents expressed self-perception of their creativity in the entrepreneurial process, including their confidence and ability to generate new ideas, solve problems, and try new approaches (e.g., "I have confidence in my ability to solve problems creatively.").

Perceptions of EC of respondents were measured using six items adapted from Yang and Xin (2020). Sample items included: "I think my household's economic situation will be better than before in the next five years." These questions assess respondents' expectations about China's or their household's overall economic situation in the short and long term.

The back-translation technology was utilized to achieve semantic comparison across languages. Subsequently, three experts in the field of entrepreneurship

validated the scale, and 30 respondents who were excluded from the formal survey were surveyed during a pilot study to show the good reliability and validity of the questionnaire (Cronbach's alpha for all variables was greater than 0.8).

Procedure

A cross-sectional online survey of Chinese higher vocational college students was conducted to test our hypotheses. The data collection time is from 4 July to 4 August, 2023, for 1 month. The questionnaire was distributed through the online Questionnaire Star platform. Participants received a questionnaire link or QR code and could access and fill out the questionnaire by clicking. After completing the questionnaire, the system automatically submitted and stored the data. The researchers monitored the questionnaire platform during the data collection period and ensured that data collection was carried out smoothly. To enhance the accuracy of the data, attention check items were integrated into the study design (Dunn et al., 2018). Participants who offered erroneous responses to these items were subsequently excluded. Moreover, respondents who completed the survey at a notably accelerated or decelerated pace (i.e., less than one-third or more than one-third of the median total duration) were also omitted from subsequent analyses (Knupfer et al., 2023).

Data analysis

SPSS (version 28) was used in this study to conduct a preliminary data analysis, including common method bias and normality. Factor loadings, Cronbach's alpha (α), and composite reliability (CR) were evaluated for the reliability and validity of the measurement model (Hair et al., 2021). The internal reliability of the constructs was determined by Cronbach's alpha (α) and composite reliability (CR); where values of both exceeded 0.7, the internal reliability was reliable. Factor loadings of measurement items exceeding 0.70 and average variance extracted (AVE) exceeding 0.50 indicate that the construct has acceptable convergent validity (Hair et al., 2021). Following Fornell and Larcker (1981) and Henseler et al. (2016), the discriminative validity of the constructs was evaluated utilizing the Fornell and Larcker criteria and heterotrait–monotrait ratios (HTMT). Multicollinearity may affect the stability and explanatory power of the model (Hair et al., 2021). The variance inflation factor tests the multicollinearity of the model, and a value less than 5 indicates no multicollinearity in the model. The bootstrapping method of Smart-PLS 4.0 was used to test the hypotheses (Hair et al., 2021)

Results

Preliminary analysis

The cumulative variance explained by Harman's single factor test was 32.879% (less than the critical value of 40%) for the first component (Podsakoff et al., 2003), indicating that the study was unaffected by common method bias. Moreover, the *p*-values of the Shapiro–Wilk normality test for each variable were less than 0.05, suggesting a non-normal data distribution (Royston, 1992). Therefore, the partial least squares structural equation modeling (PLS-SEM) method was adopted for data analysis because of its flexibility concerning data, model complexity, and relational specification (Kasilingam, 2020).

Measurement model results

Table 1 presents that the loadings of all items are greater than 0.7, α is greater than 0.7, CR surpasses 0.7, and AVE is above 0.50, confirming the measurement model's reliability and validity at the item and structural levels. Table 2 displays that the total data are less than the AVE's square root, confirming acceptable discriminant validity (Fornell & Larcker, 1981). Table 3 demonstrates that the heterotrait–monotrait ratio (HTMT), ranging from 0.072 to 0.721, is below 0.85, indicating excellent discriminant validity (Henseler et al., 2016).

Structural model results

Multicollinearity

The variance inflation factor (VIF) values for all predictors in this study were less than 5.0 (Table 4), supporting the absence of multicollinearity in the present study (Hair et al., 2021).

The structural model analysis demonstrated (Table 5) that TL and ET significantly influence EA, and hypotheses 1 and 2 were accepted. Additionally, the significant effect of EA on EI supports hypothesis H3.

Table 5 shows that EA significantly mediates the relationship between TL, ET, and EI. Since TL and ET directly and significantly affect EI (Table 6), it is explained as a partial mediation effect (Baron & Kenny, 1986; Shrout & Bolger, 2002), supporting H4 and H5.

Table 7 presents that PC and EC have a significant moderating role on EA and EI. Furthermore, the researchers drew a moderating effect diagram to intuitively reflect the moderating effect of PC and EC among variables. Figures 2 and 3 clearly show that the slope under high PC and EC is significantly greater than that under low PC and EC, indicating that, when PC and EC are at a higher level,

Table 1 Internal consistency and convergent validity

Variables	Items	Factor loading	Cronbach's alpha	CR	AVE
TL	TL1	0.884	0.880	0.890	0.675
	TL2	0.824			
	TL3	0.783			
	TL4	0.782			
	TL5	0.833			
ET	ET1	0.787	0.886	0.891	0.637
	ET2	0.866			
	ET3	0.768			
	ET4	0.781			
	ET5	0.795			
	ET6	0.786			
EA	EA1	0.876	0.891	0.895	0.696
	EA2	0.821			
	EA3	0.833			
	EA4	0.848			
	EA5	0.792			
EI	EI1	0.877	0.897	0.900	0.661
	EI2	0.832			
	EI3	0.810			
	EI4	0.794			
	EI5	0.752			
	EI6	0.807			
EC	EC1	0.844	0.893	0.900	0.651
	EC2	0.803			
	EC3	0.779			
	EC4	0.790			
	EC5	0.799			
	EC6	0.826			
PC	PC1	0.838	0.884	0.884	0.682
	PC2	0.816			
	PC3	0.821			
	PC4	0.816			
	PC5	0.823			
	PC6	0.791			

the impact of students' EA on EI is stronger; that is, PC and EC positively moderate the effect of EA on students' EI. Hence, H6 and H7 were supported.

Discussion

This study first found that the TL style of entrepreneurial mentors can promote EA and EI among higher vocational college students. TL directly or indirectly affects organizational innovation by affecting employees' climate, attitude, and behavior (Alblooshi et al., 2021). Similarly, entrepreneurial mentors' TL can also affect the innovation and entrepreneurship of higher vocational college students (Fauzi et al., 2021; Wang et al., 2023). Compared with other educators in the school, entrepreneurial mentors can provide students who want to start their businesses with comprehensive guidance from idea cultivation to practical implementation (Emery et al., 2019; Sarabipour et al., 2022). This result fills the gap in the existing literature and provides a new perspective on entrepreneurship education, that is, the adoption of transformational leadership in entrepreneurship education.

Consistent with previous literature (Boubker et al., 2021; Liu et al., 2019; Wardana et al., 2020), ET significantly and positively influenced EA. As expected, this study identified that EA positively enhances EI, consistent with the study of Mahfud et al. (2020) and Fenech et al. (2019). Moreover, this study identified the mediating role of EA between TL styles/ET and EI, supported by Mahendra et al. (2017) and Yousaf et al. (2021). This finding means that students' EA can promote positive responses to leadership styles and entrepreneurial ET, affecting their EI. This finding emphasizes that, in entrepreneurship education, we should focus on not only transferring knowledge and skills but also cultivating attitudes and psychological qualities, providing a strategic direction for improving educational effectiveness.

The moderating effect of PC and EC between EA and EI was also confirmed in this study. This result highlights the PC and EC in student entrepreneurial processes, particularly in moderating the relationship between EA and EI, which makes up for the lack of the role of PC between the two variables in the current study, particularly the role of economic confidence after COVID-19. This result provides a new perspective for researchers to deeply understand the process of EI formation, emphasizing the importance of individual cognition in the entrepreneurial process, especially in PC and EC.

Conclusions, limitations, and future directions

This research examines the impact of TL and ET on EI and explores the mediating role of EA and the moderating role of PC and EC. It has proven that TL via entrepreneurial mentors and effective ET can cultivate higher vocational college students' EA, enhancing their EI. This means that entrepreneurial mentors need to have not only entrepreneurial knowledge and experience but also effective leadership and educational skills to guide higher vocational college students to cultivate a positive EA and enhance their EI. Moreover, the study clarified that students' EA mediates between entrepreneurial mentors' TL/ET and EI.

Table 2 Fornell–Larcker criterion

Construct	1	2	3	4	5	6
EA	0.834					
EI	0.647	0.813				
ET	0.588	0.502	0.798			
TL	0.543	0.472	0.483	0.822		
PC	0.300	0.368	0.223	0.243	0.826	
EC	0.240	0.343	0.288	0.272	0.226	0.807

Table 3 Discriminant validity (HTMT)

Construct	1	2	3	4	5	6	7	8
EA								
EI	0.721							
ET	0.654	0.561						
TL	0.605	0.527	0.540					
PC	0.340	0.413	0.251	0.275				
EC	0.265	0.375	0.320	0.307	0.256			
EC * ET	0.215	0.052	0.224	0.123	0.023	0.069		
PC * ET	0.208	0.051	0.225	0.239	0.077	0.027	0.072	

Table 4 Multicollinearity test

Constructs	VIF
EA	
ET ≥ EA	1.307
TL ≥ EA	1.307
EI	
ET ≥ EI	1.690
EA ≥ EI	1.872
TL ≥ EI	1.572
PC ≥ EI	1.187
EC ≥ EI	1.146
EC * EA ≥ EI	1.061
PC * EA ≥ EI	1.091

Table 5 Hypotheses analysis

Hypothesis		Beta	SD	*T*-value	*p*-Value	Result
H1	TL ≥ EA	0.338***	0.051	6.669	0.000	Supported
H2	ET ≥ EA	0.424**	0.049	8.603	0.004	Supported
H3	EA ≥ EI	0.467***	0.060	7.807	0.000	Supported

***$p < 0.001$, **$p < 0.01$

Table 6 Mediating analysis

Hypothesis		Beta	SD	*T*-value	*p*-Value	Result
Indirect effect						
H4	TL ≥ EA ≥ EI	0.158***	0.035	4.669	0.000	Supported
H5	ET ≥ EA ≥ EI	0.198***	0.035	5.716	0.000	Supported
Direct effect						
	TL ≥ EI	0.123*	0.059	2.101	0.018	
	ET ≥ EI	0.155**	0.059	2.933	0.004	

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Table 7 Moderating analysis

Hypothesis		Beta	SD	*T*-value	*p*-Value	Result
H6	PC * EA ≥ EI	0.165***	0.045	3.628	0.000	Supported
H7	EC * EA ≥ EI	0.107**	0.040	2.667	0.004	Supported

***$p < 0.001$, **$p < 0.01$

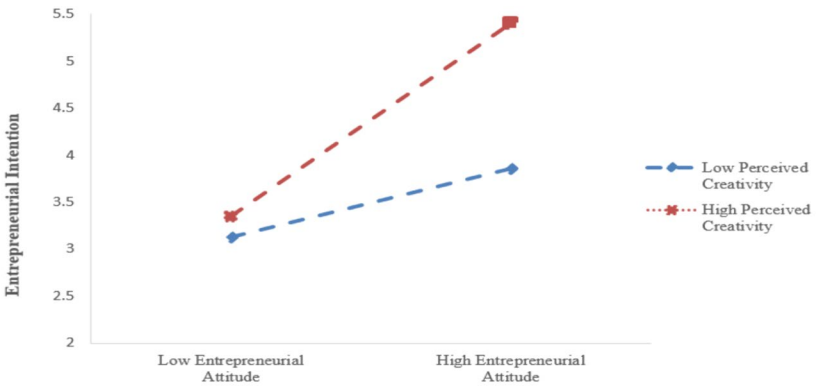

Figure 2 Moderating effect of perceived creativity

These results suggest that the leadership and training of entrepreneurial mentors indirectly affect students' EI. Another important finding is that the PC and EC of students play a moderating role between EA and EI. This result indicates that, although EA is positively correlated with EI, the strength of this relationship depends on the PC and EC of students. High intensity of PC and EC can strengthen the impact of EA on EI. This result means that, compared with college students with weaker PC and EC, students with stronger PC and EC are more likely to develop EI if they have a positive attitude toward entrepreneurship.

Therefore, schools and entrepreneurial mentors can encourage college students to cultivate creativity through various means, further enhancing the positive

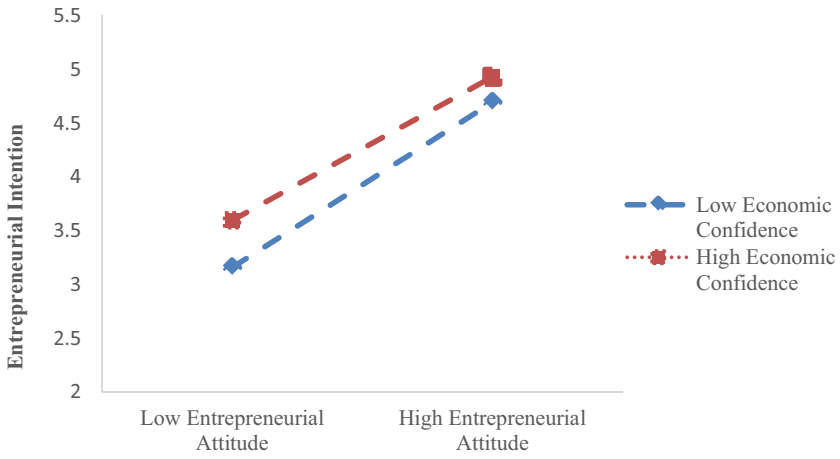

Figure 3 Moderating effect of economic confidence

impact of EA on EI. To stimulate higher vocational college students' entrepreneurial potential and intention, schools should encourage entrepreneurial mentors to adopt a TL style such as positive motivation, personalized attention, and intelligent stimulation while also committing to developing ET, for example, case studies, project-based learning, and industry internships to enhance entrepreneurial thinking and skills. Also, they should encourage students to establish a positive EA and be brave enough to take on entrepreneurial risks. Notably, economic confidence also plays a moderating role in EA and EI. Especially after COVID-19, higher education institutions, governments, and related entrepreneurship support institutions need to help students build positive expectations for economic prospects through education, training, and policy support, thereby enhancing their entrepreneurial intentions.

In summary, these research findings can guide universities, entrepreneurial mentors, and higher vocational college students, assisting them in effectively participating in entrepreneurship education. Meanwhile, this study developed the relationship among TL, EA, and EI and explored the moderating effect of PC and EC, an important supplement to the study of the EI system. Furthermore, it clarifies the role of TL, providing a reference for leadership style research in organizational behavior of entrepreneurial education. Despite providing essential implications, some limitations exist in this research. Firstly, this research used a cross-sectional method to collect data that only represented conclusions at a specific time. Future research can use longitudinal studies to track the development of research subjects at different time points. Moreover, since the survey data in this study only came from China, the generalization of research results is limited. Future research can investigate the EI of other countries to test the model's applicability. Finally, although this study confirms the effect of entrepreneurial

mentors on students' EI, many other social factors can be tested in future research to determine the influence of classmates, friends, and family factors on students' EI.

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Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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