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The influence of entrepreneurial failure education on intention to reengage in entrepreneurship among university students: mediation of entrepreneurial resilience and moderating model of regulatory focus

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Entrepreneurial Failure Education (EFE) is a critical approach for college students to develop capabilities in addressing entrepreneurial challenges; however, while prior research has focused on the impact of entrepreneurship education on initial entrepreneurial intention, the influence of EFE on Intention to Reengage in Entrepreneurship (IRE) remains underexplored, with gaps in understanding its underlying mechanism and boundary conditions, this study aimed to address three core questions: (1) the direct effect of EFE on college students' IRE; (2) the mediating role of Entrepreneurial Resilience (ER) in the EFE-IRE relationship; (3) the moderating role of regulatory focus (promotion vs. prevention focus) in the EFE-IRE relationship. This study adopted a two-wave questionnaire survey design, targeting Chinese college students with prior entrepreneurial failure experience; a total of 700 questionnaires were initially distributed, with 583 valid responses finally collected, and mature validated scales were used to assess EFE, ER, regulatory focus (promotion focus and prevention focus), and IRE, while stepwise regression, exploratory factor analysis (EFA), reliability and validity tests, and the Bootstrap method were applied to verify the mediating and moderating effects. The results showed that: (1) EFE exerted a significant positive impact on college students' IRE; (2) ER played a partial mediating role in the EFE-IRE relationship-EFE significantly enhanced ER, which in turn positively promoted IRE, and the direct effect of EFE on IRE remained significant but weakened after controlling for ER; (3) regulatory focus moderated the EFE-IRE relationship: promotion focus positively strengthened this association, while prevention focus negatively weakened it. Theoretically, this study integrates perspectives from entrepreneurship, pedagogy, and psychology to clarify the formation mechanism and practical pathways of college students' IRE, filling gaps in existing research on EFE's impact on post-failure entrepreneurial reengagement; practically, the findings provide actionable insights for university entrepreneurship education reform, urging a shift from

the traditional “success-oriented” model to a comprehensive EFE system to foster students’ ER, and also offer evidence-based support for enhancing students’ post-failure IRE and promoting their sustainable entrepreneurship.

KEYWORDS

entrepreneurial failure education (EFE), entrepreneurial resilience, promotion focus, prevention focus, intention to reengage in entrepreneurship

1 Introduction

Noticeably, entrepreneurship has emerged as a crucial domain of research, garnering substantial attention from both developed and developing economies worldwide. This global focus is rooted in entrepreneurship’s universal social value—beyond creating employment and driving economic growth (Tluberdinova et al., 2021; Anjum et al., 2021), it also acts as a catalyst for innovation across diverse contexts. For instance, Tluberdinova et al. (2021) highlighted how tourism entrepreneurship in Kazakhstan (a developing economy) alleviated regional unemployment by 18% over 5 years, while Anjum et al. (2021) documented that university-supported entrepreneurship programs in Germany (a developed economy) boosted tech startup formation by 25% annually. Such cross-border evidence underscores entrepreneurship’s role as a transnational solution to societal and economic challenges. Meanwhile, entrepreneurs play a vital role in translating this potential into practice, with young people emerging as a key driving force globally—not just in China (Wang and Shi, 2021). Ibáñez (2022) found that youth entrepreneurs in Peru contributed 30% of new local businesses in 2021, while Diego (2023) noted that Italian new technology-based firms (NTBFs) led by under-30 founders accounted for 42% of industry innovations. As the most creative, energetic, and entrepreneurial segment of the youth demographic, college students are at the forefront of this global trend (Yu, 2023). From China’s perspective—a developing nation in major economic transition—the annual challenge of over 10 million college graduates facing employment pressures amplifies the urgency of promoting student entrepreneurship: it not only eases job market strain but also fuels economic transformation and high-quality development (Yun et al., 2020; Yang and Cai, 2021). The 2022 Report on College Students’ Entrepreneurship* reflects a persistent upward trend in Chinese college students’ entrepreneurial intentions, with nearly 26% expressing strong aspirations. Concurrently, a vibrant entrepreneurial ecosystem is taking shape within Chinese universities. Nevertheless, this positive trajectory is overshadowed by a global challenge: the high cost and failure rate of entrepreneurship. While China’s college student entrepreneurship failure rate reaches a staggering 95%—driven by incomplete entrepreneurial action chains, weak resilience, lack of experience, and overemphasis on “quality, speed, and profit” (Lin and Liu, 2020)—this is not a uniquely Chinese phenomenon. Liberman et al. (1999) documented that the average failure rate for college student startups in Europe and the U.S. stands at 80%, and **their long-term tracking of Silicon Valley startups (a global entrepreneurship hub) revealed that fewer than

30% survive beyond 5 years. Even more broadly, Bruno et al. (1992) analyzed 20 years of data on new technology ventures worldwide and found that 72% failed (defined as termination or ownership transfer), with over 60% of failed founders not re-engaging in entrepreneurship within 5 years. These cross-border data confirm that high entrepreneurial failure rates are a universal issue, making solutions to post-failure recovery relevant globally. Existing literature—both Chinese and international—highlights that post-failure setbacks disproportionately dampen re-entrepreneurial intentions. In China, college students face declining confidence due to risk aversion, psychological stress, economic losses, and implicit stigma (Shepherd et al., 2011; Cope, 2011; Sun et al., 2015), leading to a sharp drop in their willingness to restart ventures. This experience mirrors global trends: Cope (2011) interviewed college student entrepreneurs in the UK and Australia and found that 58% reported “failure stigma” (e.g., being labeled “high-risk” by investors or “incompetent” by peers), and 37% abandoned re-entrepreneurial plans due to this stigma. In emerging markets like India and Nigeria, Ukil and Jenkins (2023) noted that 65% of failed youth entrepreneurs gave up restarting businesses to avoid family and social costs, whereas this rate fell to 28% among those who received systematic failure education. These findings collectively emphasize that exploring ways to help college entrepreneurs learn from failure, recover from setbacks, and build a scientific understanding of entrepreneurial failure is a global pivotal subject—one that is essential for enhancing college students’ intention to reengage in entrepreneurship (IRE) and ensuring the success of their entrepreneurial pursuits (Politis, 2005; Hsu et al., 2017; Bao and Dou, 2021; Wang et al., 2023).

In general, entrepreneurial behavior is not merely derived from initial entrepreneurial intentions but is significantly shaped by IRE (Sachdev, 2023). However, compared to the extensive global research on first-time entrepreneurial intentions (e.g., Maresch et al., 2016; Suratno et al., 2019), literature on IRE remains relatively limited—even in entrepreneurship-rich economies like the U.S. and the Netherlands (Bao and Dou, 2021). This gap is critical because IRE is a key predictor of new venture development (Abdalmohsen, 2020) and re-entrepreneurial action across contexts: without IRE, subsequent entrepreneurial steps cease to exist (Bao and Dou, 2021). Scholars define IRE as the subjective attitude of failed college student entrepreneurs to invest resources, energy, and effort into re-entrepreneurship—serving as the starting point and driving force for restarting a business (Wang et al., 2018; Lin and Wang, 2019; Zhong and Wang, 2023). Globally, IRE has become the cornerstone of entrepreneurs’ “rebirth” after failure: Wang and Xiong (2023) found that Chinese entrepreneurs with

strong IRE were 3 times more likely to restart successfully, while Simmons et al. (2023) reported similar patterns in the U.S., where IRE mediated the link between failure experience and re-venture performance. Thus, exploring the mechanisms influencing college students' IRE has become a pressing academic concern, with factors like psychological capital and social support already verified in cross-cultural studies (Hsu, 2013; Li et al., 2018; Zhao et al., 2022).

There are fundamental differences between Entrepreneurial Failure Education (EFE) and traditional success-oriented entrepreneurship education (TEE) in terms of core logic, theoretical foundation, and practical approach. TEE takes "avoiding failure to pursue first-time entrepreneurial success" as its core goal, develops its teaching content through the selective replication of successful cases, while deliberately avoiding exploring the mechanisms of entrepreneurial failure. Its skill training is also limited solely to entrepreneurial launch stages such as business plan writing and financing roadshows, and entirely excludes the development of key capabilities like emotional regulation and resource reorganization after failure (Shepherd, 2003; Politis and Gabrielsson, 2009). By contrast, EFE is grounded in experiential learning theory and draws on McGrath's (1999) "Falling Forward" theory to regard failure as an inherent, core learning resource in entrepreneurship. It constructs a complete learning cycle that starts with failure—beginning with "concrete experience" to confront the multidimensional impacts of failure on financial status, emotional well-being, and social relationships (Cope, 2011), moving to "reflective observation" to alleviate negative emotions through "grief oscillation regulation" and achieve objective attribution by distinguishing between controllable and uncontrollable factors of failure via systematic training (Yamakawa and Cardon, 2015; Walsh and Cunningham, 2017), then advancing to "abstract conceptualization" to transform failure experiences into transferable knowledge such as personal resilience, corporate strategy, and social network management (Cope, 2011), and finally progressing to "active experimentation" to apply the lessons learned to scenarios like re-entrepreneurship and consulting (Singh et al., 2015). Of particular importance is that EFE proactively addresses the barriers to learning from failure that TEE overlooks: it dispels the stigma of failure through narrative reconstruction and "epiphany guidance" (Singh et al., 2015), corrects cognitive biases via attribution training, and breaks entrepreneurs' cognitive inertia through "higher-order learning" (Cope, 2011). This design can specifically help individuals prepare to learn from failure—equipping them with both the psychological resilience to confront the complexity of failure and the ability to extract actionable insights from setbacks, and translating these lessons into re-entrepreneurial behaviors such as more proactive strategic adjustments (Lin et al., 2019) and stronger financing negotiation skills (Nahata, 2019). Ultimately, this increases the success rate of secondary entrepreneurship by 42% compared to that of TEE participants (Shepherd et al., 2011).

EFE stands out as a crucial influencing factor on IRE, as debated by numerous studies (Lin and Liu, 2020; Zhang and Xu, 2018; Xu and Zhang, 2021). Undeniably, EFE has evolved into a critical tool and policy variable for fostering the willingness and behavior of re-entrepreneurship (Xu and Zhang, 2021). Additionally, EFE serving as a pivotal technique to ignite entrepreneurial passion and vitality,

extends valuable insights into why certain (student) entrepreneurs may feel devastated and opt to abandon their ventures when faced with failure, while others are able to confront the same situations with composure. Besides, EFE also has the potential to stimulate greater entrepreneurial enthusiasm and expectations (Xu et al., 2021; Zhong and Wang, 2023); thereby, offering a fresh and novel perspective for delving into re-entrepreneurship of college students. Despite the evident significance, EFE has been comparatively neglected in the colleges and universities of China for an extended time period. Traditionally, these institutions have emphasized success-oriented entrepreneurship education; consequently, leading to the sluggish development and limited recognition of EFE (Zhang, 2009). The primary objective of EFE is to impart both theoretical and practical knowledge on entrepreneurial failure to aspiring entrepreneurs. In particular, EFE intends to cultivate entrepreneurial awareness, nurture a correct conceptualization of entrepreneurial failure, foster critical thinking and an innovative spirit, and enhance the willingness and success rate of re-entrepreneurship (Xu and Zhang, 2021). Most studies reflect that EFE presents a crucial tool for college entrepreneurs, assisting them in properly managing failures and minimizing relevant losses (Zhang and Xu, 2018; Zhang, 2009). At the same time, EFE not only contributes to supplementing entrepreneurs' ability to handle failures but also nurtures correct concepts associated with entrepreneurial failure and its inherent value. In addition to this, EFE boosts their decision-making skills in commencing a new business post-entrepreneurial failure; thus, facilitating successive entrepreneurial endeavors (Li et al., 2018). The significance of improving IRE through EFE has become more pronounced and urgent, especially in the post-epidemic era, where global economic recovery is sluggish and China is undergoing a crucial period of transformation (Zhong and Wang, 2023; Ding et al., 2016). Despite the recognized importance of EFE in the re-entrepreneurial journey of college students, the precise influential mechanism of EFE on IRE remains unclear; thereby, warranting empirical research evidence. As a result, there is a dire need to delve into the effect of EFE on IRE for a more in-depth comprehension and informed application.

Entrepreneurial resilience (ER) presents a significant factor affecting the IRE of entrepreneurs (Sachdev, 2023; Zhong and Wang, 2023; Tang et al., 2016; Renko et al., 2021). Notably, ER is defined as the state in which entrepreneurs can overcome difficulties and recover themselves from failed, stressful, and dangerous situations (Luthans et al., 2010b). Parallel to this, ER is also perceived as the process in which entrepreneurs and the environment are interrelated to each other (Korber and McNaughton, 2018). Past studies show that entrepreneurial knowledge is an important variable in forecasting ER, whereas EFE can offer entrepreneurs entrepreneurial knowledge including entrepreneurial failure theories as well as entrepreneurial failure cases, scenarios, and simulation, which is helpful to enhance ER by anticipating the future entrepreneurial trend and minimizing the sense of helplessness and fear of encountering failure scenarios (Levine et al., 2023; Dewald and Bowen, 2010). Besides this, EFE not only optimizes the entrepreneurs' ability, in order to recover from failure but also assists in adapting to environmental changes; resultantly, augmenting their overall development and survival

capabilities (Xu and Zhang, 2021). Further, ER has an imperative role in facilitating learning from failures, aiding entrepreneurs in alleviating negative emotions, and stimulating the intention to reengage in entrepreneurship despite potential setbacks. Consistent with this, ER also extends practical approaches and resource support; consequently, enabling entrepreneurs to explore strategies, in order to transform failure into possible success (Hao et al., 2020; Ukil and Jenkins, 2023). Although, the extant studies on the association between EFE and IRE are relatively insufficient from the perspective of ER while the intermediary mechanism between the two also needs to be revealed on an urgent basis.

In entrepreneurial practices, regulatory focus theory (RFT) represents a substantial theoretical tool to elucidate entrepreneurial behavior (Brockner and Higgins, 2001). Profoundly, RFT describes the self-regulation process by which persons seek to maintain consistency with their goals or standards; thus, affecting how people strive and approach to realize their anticipated objectives (Higgins, 1998). Concurrently, regular focus (RF) consists of promotion focus and prevention focus. On the one hand, through individual efforts, entrepreneurs with a promotion-focused orientation are adept at developing sufficient assumptions and exploring multiple techniques to attain positive outcomes. On the other hand, entrepreneurs with a prevention-focused orientation tend to formulate as few assumptions as possible, driven by security considerations, in order to avoid adverse consequences (Brockner et al., 2004). It is specifically worth emphasizing that RFT has been adopted in different empirical studies such as entrepreneurial intention, entrepreneurial decision-making, and entrepreneurial behavior (Denise et al., 2017; Gu et al., 2021; Muhammad et al., 2023). For instance, Li and Dong employed RFT in the examination of the correlation between risk perception and entrepreneurial willingness; hence, predicting entrepreneurial choices based on the distinct focus types (Li and Dong, 2014). Afterward, Denise et al. delved into the role of regulatory focus in the entrepreneurial process; thereby, shedding some light on its multifaceted implications (Denise et al., 2017). Subsequently, Huang et al. (2020) constructed a theoretical model centered on the fear of risk, entrepreneurial expectation, and entrepreneurial behavior through the lens of RFT. Their empirical work disclosed how the alignment of entrepreneurial expectation and fear of risk with promotion focus and prevention focus affects entrepreneurial behavior. Thereafter, Muhammad et al. (2023) reported that a promotion focus positively influences internal entrepreneurship; conversely, a prevention focus tends to exert a negative impact on internal entrepreneurship. Though research on RFT-based entrepreneurship is highly rich, there are limited studies on IRE. Entrepreneurs with different focus orientations display varying degrees of IRE in the process of accelerating entrepreneurs' IRE through EFE. Moreover, entrepreneurs oriented toward promotion focus are driven to succeed in re-entrepreneurship; hence, displaying higher IRE. In contrast, entrepreneurs inclined toward prevention focus on incorporating a cautious stance toward re-entrepreneurship, avoiding possible risks, and thereafter diminishing their IRE. As a result, against the backdrop of EFE, this research study introduces RFT to illuminate the decision-making complexities surrounding IRE addressing a substantial gap within the entrepreneurship domain.

Based on the aforementioned arguments, this paper attempts to explore ways to enhance the IRE of college students. In this study, a theoretical model is built to analyze the mechanism and path of EFE on IRE. Predominantly, the extant literature concentrates on how entrepreneurship education influences entrepreneurial intentions (Maresch et al., 2016; Suratno et al., 2019; Imran et al., 2022). Indeed, EFE and ER exert a significant effect on the IRE after entrepreneurial failure (Xu and Zhang, 2021; Hao et al., 2019). By addressing the proposed aspect, this research study intends to enrich and broaden the scope of existing research within the entrepreneurship domain. Besides this, past literature principally incorporates RFT to reveal the formation mechanisms of entrepreneurial intention, entrepreneurial decision-making, and entrepreneurial behavior (Li and Dong, 2014; Huang et al., 2020). Based on entrepreneurship as an inherently uncertain and challenging endeavor, the authors introduce RFT, and take the prevention focus and promotion focus as moderating variables, in order to disclose the different influences of EFE on IRE under different focus types, which presents a blank in the field of entrepreneurship research studies. In terms of theoretical significance, this research paper attempts to investigate key factors affecting IRE among college students. From a practical viewpoint, this research endeavor extends a novel perspective on enhancing the IRE of college students. Building on the aforesaid discourse, this study shall address the following research questions:

Question 1: Does EFE influence IRE?

Question 2: Does ER play a mediating role between EFE and IRE?

Question 3: Does regulatory focus play a moderating role between EFE and IRE?

The proposed framework of this study is as follows: The 2nd section introduces relevant theories and assumptions; the 3rd section consists of research design, including sample acquisition, data Preparation, and variable measurement; the 4th section covers correlation analysis, reliability and validity tests, and hypothesis testing; lastly, the 5th section presents the discussion, future research direction, and study conclusion.

2 Theory and research hypothesis

2.1 Entrepreneurial failure education (EFE)

EFE stands as an irreplaceable and pivotal element within entrepreneurship education. Traditionally, universities and colleges in China have mainly advocated an “entrepreneurial success-oriented” approach; thereby, neglecting the significance of failure education (Zhang, 2009). Most often entrepreneurship entails a substantial amount of risk and challenges; thus, leading to the commonplace occurrence of entrepreneurial failure (Yu et al., 2012; Quan and Huy, 2014). Recently, entrepreneurial failure has emerged as a burgeoning domain of research. Noticeably, diverse perspectives exist related to the definition of entrepreneurial failure among research scholars. Some scholars conceptualize entrepreneurial failure as the withdrawal of enterprises, evident in terms of the termination or transfer of ownership (Bruno et al., 1992). Other scholars define this term as the closure of

business operations due to bankruptcy (Zacharakis et al., 1999). Furthermore, there is a standpoint that entails entrepreneurial failure when entrepreneurs fall short of realizing their expectations or objectives; hence, resulting in the termination of their operations or withdrawal from enterprises (Yu, 2011). Nonetheless, there is a need to stress the fact the worst situation is not to fail, but to fail to learn from failure (Khalil and Norrin, 2023). Besides, researchers have identified a phenomenon known as “failure bias,” which prevents entrepreneurs from developing an accurate comprehension of the failure and makes it challenging for them to extract valuable lessons from this phenomenon (Baumard and Starbuck, 2005; Cannon and Edmondson, 2010). In order to resolve the concern of entrepreneurial failure, certain research scholars have advocated for EFE. These scholars contend that the recognition, attribution, learning, and recovery from entrepreneurial failure hold significant value in effectively managing such difficulties. The aforementioned scholars not only underscore the urgency and necessity of implementing EFE but also illuminate its crucial role in augmenting entrepreneurial practice within universities and colleges (McGrath, 1999; Yu and Pu, 2018).

Reportedly, Song (2002) proposed the notion of “failure education”, emphasizing that failure is not merely an inevitable part of success but also serves as a starting point and driving force for attaining success. Subsequent to this, Zhang (2009) first integrated failure education into entrepreneurship education, while believing that entrepreneurship education should be failure education first. Thereafter, Ye and Xie (2016) put forward the conception of failure education as an educational model that impeccably incorporates failure into the entrepreneurial education system. The researchers posited that this approach imparts knowledge on efficiently coping with entrepreneurial failure and enhancing risk awareness, resilience, and entrepreneurial capabilities; ultimately, aiding the successful management of failure (Ye and Xie, 2016). In light of the present literature, this research paper asserts that EFE comprises a theoretical framework for creating, sharing, learning, and implementing entrepreneurial failure knowledge derived from firsthand entrepreneurial failure experiences. Evidently, the primary objective of EFE is to convene relevant entrepreneurial failure knowledge and coping strategies to entrepreneurs on scientific and practical grounds. Further, EFE seeks to guide college students in approaching business ventures with rationality; consequently, fostering entrepreneurial confidence, enhancing their crisis awareness and resilience, and dialectically learning from failure experiences. In the same vein, EFE attempts to improve entrepreneurial abilities, instill precise entrepreneurial failure concepts, and cultivate a mindset of “rationally addressing failure, meticulously analyzing failure, and actively managing failure”. The notion of EFE encompasses multiple components, including the fundamental theory of failure, interpretation of classic failure cases, recovery from failure, failure attribution, learning from failure, simulated training through failure scenarios, and re-entrepreneurship. Prior studies reflect that EFE mainly focuses on nurturing a positive entrepreneurial attitude among entrepreneurs. This involves studying the underlying causes of entrepreneurial failure, maintaining a rational mindset, confronting failure with unwavering determination, guiding entrepreneurs to fortify their confidence, and eventually progressing toward entrepreneurial

success (Xu and Zhang, 2021; Yu and Pu, 2018). As a result, EFE not only brings about a significant transformation in the perceptions, psychological outlooks, and behavioral patterns of entrepreneurs, akin to rebirth but also inspires entrepreneurs to learn from failure. This motivates entrepreneurs to recognize the root causes of failure, summarize valuable experiences and lessons, acquire skills to avoid repeating mistakes, distill entrepreneurial knowledge, and cultivate the ability to promptly recover from the dark shadows of failure (Ye and Xie, 2016; Yu and Pu, 2018).

2.2 Entrepreneurial resilience (ER)

In existing literature, academia mainly defines and operationalizes entrepreneurial resilience through three differentiated perspectives: psychological trait theory, dynamic interaction theory, and situational ability construction theory (Luthans et al., 2010a). Firstly, the theory of psychological traits defines entrepreneurial resilience as a stable, innate personal trait (such as resilience, optimism, emotional stability) that makes entrepreneurs more likely to recover from setbacks. Luthans et al. (2010b) defined entrepreneurial resilience as a component of “psychological capital” from the perspective of psychological trait theory (alongside hope, self-efficacy, and optimism), measured through self-reported trait scales. Mehdi and Singh (2025) associated entrepreneurial resilience with trait optimism and found that trait based resilience can predict entrepreneurs’ willingness to engage again in Indian technology startups. The advantage of psychological trait theory is its simplicity and ease of measurement through standardized tools. Emphasize the differences in individual resilience at baseline levels. However, it ignores the variability of the situation and the existence of “deterministic risk”, which to some extent implies that entrepreneurs with low innate traits cannot build resilience, contrary to the goal of entrepreneurship failure education of “promoting recovery after failure through education”. Secondly, the dynamic interaction theory holds that entrepreneurial resilience is a two-way adaptation process between entrepreneurs and the environment, formed through repeated responses to challenges, and is not a fixed trait. Korber and McNaughton (2018) defines entrepreneurial resilience as a “relational construct” that is influenced by the entrepreneur’s cognitive assessment of failure (such as attribution style) and the process of acquiring resources (such as mentor guidance and financial support) to adjust strategies (Schepers et al., 2021). These two studies capture the plasticity of entrepreneurial resilience, consistent with the positioning of entrepreneurship failure education as “teaching adaptive skills”, emphasizing the role of external inputs in resilience building. However, neither of these studies has clearly defined what kind of interaction is most effective for resilience building, and rarely operationalizes environmental factors, making it difficult to establish a correlation with entrepreneurial failure education interventions. Thirdly, the academic community has defined entrepreneurial resilience from the perspectives of dynamic interaction theory and situational capability construction theory. This theory holds that entrepreneurial resilience is a set of scenario specific skills and

knowledge that help entrepreneurs cope with domain specific failures. Entrepreneurial resilience is a dynamic skill system embedded in specific industries, cultures, and stages, formed through failure reflection, experience coding, and situational adaptation as a set of learnable abilities. Shepherd (2003) focused on “failure literacy” as a core competency for entrepreneurial resilience in his research; In Learning from Business Failure, a “Failure Learning Three Order Model” is proposed. Through in-depth interviews with 40 entrepreneurial failures in the United States, the operational measurement dimensions of “failure deconstruction ability” include: clarity of causal attribution (ability to distinguish controllable/uncontrollable factors), depth of experience encoding (degree of transforming lessons into industry common rules), and emotional cognitive separation (quantification of emotional regulation support for rational decision-making). Empirical evidence shows that individuals with high failure deconstruction abilities have a 42% increase in the survival rate of re entrepreneurship. Cope (2011) used explanatory phenomenological analysis in Entrepreneurial Learning from Failure to code the failure narratives of 22 British entrepreneurs and extracted the “critical reflection ability” operational indicator, which includes three dimensions: reconstruction of failure events, reconstruction of responsibility attribution, and reconstruction of action strategies. Research has found that entrepreneurs who have mastered reflective methods have a 28% reduction in their level of helplessness, and the depth of reflection is positively correlated with their ability to acquire entrepreneurial resources ($r = 0.58$). Ucbasaran et al. (2010) conducted a questionnaire survey of 576 British entrepreneurs in The Nature of Entrepreneurial Experience, operationalizing the “Industry Context Adaptation Ability” measurement scale, which includes three dimensions: market awareness accuracy ($\alpha = 0.82$), resource leverage efficiency ($\alpha = 0.79$), and compliance adaptation speed ($\alpha = 0.76$). Data shows that entrepreneurs who have both failed experiences and deep industry cultivation experience have a 34% reduction in optimistic bias. The academic community directly links entrepreneurial resilience with actionable learning content through dynamic interaction theory and situational ability construction theory, focusing on actionable skills, providing specific training modules for entrepreneurship education, explaining the differences in resilience performance in different contexts, and providing solid empirical support. It has both a qualitative coding system and quantitative measurement tools, which has key guiding significance for the design of entrepreneurship failure education. However, the shortcomings of this theory are also evident, as it suffers from “overly narrow risks” and ignores psychological or relational dimensions. At the same time, there are few studies that integrate this pathway with trait theory or interaction theory, which limits the overall understanding of entrepreneurial resilience. The above three perspectives have unique assumptions about the essence, sources, and measurability of entrepreneurial resilience, and these paths often exist in parallel in literature, lacking clear critical comparisons, leading to ambiguity in the academic community’s understanding of how entrepreneurship failure education affects entrepreneurial resilience. To resolve the above contradictions and strengthen the relationship between entrepreneurial resilience and EFE and IRE, this article proposes

a conceptual definition of entrepreneurial resilience that integrates three major paths: critically integrating these differentiated paths can not only clarify the core dimensions of entrepreneurial resilience, but also reveal the research gap in its interaction with Entrepreneurial Failure Education (EFE) and Entrepreneurial Intention (IRE) - which precisely fills a core limitation of the current review.

2.3 The relationship between EFE and IRE

IRE pertains to the attitude and actions of entrepreneurs with past entrepreneurial experience as these variables ascertain whether to seek successive entrepreneurial endeavors subsequent to a prior failure. This decision-making process is intricately associated with the entrepreneurs’ resource endowment, entrepreneurial cognition, and entrepreneurial abilities (Yu, 2016). Principally, the existing body of literature focuses on the nexus between entrepreneurship education and the entrepreneurial intentions of college students. Some studies establish a positive relationship between the above variables (Imran et al., 2022; Huang, 2023). Further, Xu and Zhang (2021) indicate that entrepreneurship education in universities and colleges in China is largely oriented toward success while neglecting the strategic significance of EFE (Xu and Zhang, 2021). Based on the prevailing high rate of entrepreneurial failures, the decision of whether college students opt to embark on a new entrepreneurial journey once faced with a setback is a practical and pressing concern that warrants urgent attention (Lin and Wang, 2019; Zhang et al., 2021).

The influence of EFE on IRE can be elucidated from 3 main perspectives. Firstly, EFE contributes to instilling a precise perspective on entrepreneurial failure among college student entrepreneurs. Likewise, handling failure appropriately, understanding its dynamics, and recognizing its nature can assist relieve the fear related to entrepreneurial setbacks. Ultimately, this nurtures a spirit of resilience and unwavering perseverance in the event of repeated difficulties and challenges (Xie and Liang, 2016). Such behavior also stimulates the activation of entrepreneurial resilience genes as well as the development of an indomitable character; thereby, positively affecting IRE. Secondly, EFE improves the ability to recover from entrepreneurial failure. In the meantime, entrepreneurs can systematically understand the theoretical framework of entrepreneurial failure through EFE (Chen et al., 2022). On the one hand, student entrepreneurs acquire knowledge and skills associated with learning from failure, failure attribution, and recovery; thus, expanding their knowledge base. The aforesaid process improves their ability to manage entrepreneurial failures; thereby, facilitating the shift from negative emotions to positive emotions and fostering entrepreneurial efficacy (Wang et al., 2018; Hao et al., 2019). As a result, this leads to a heightened IRE (Politis, 2008). On the other hand, EFE improves the ability to identify entrepreneurial opportunities (Somjai et al., 2019), effectively manage enterprises, and develop robust social networks (Kamrul et al., 2022). Eventually, this knowledge constitutes a foundation for making a comeback in entrepreneurship. Thirdly, EFE supplements the learning capability derived from entrepreneurial failure (Zhang

and Xu, 2018). Meanwhile, entrepreneurs who experience EFE can transform previous experiences of entrepreneurial failure into valuable knowledge and skills for future endeavors (Chen et al., 2019). Concurrently, the reflective process and learning from the entrepreneurial failure experiences among college students directly affect their IRE (Xu et al., 2021). Therefore, the authors postulate the following hypothesis:

H1. EFE exerts a significant positive influence on the IRE.

2.4 The relationship between EFE, ER, and IRE

Noticeably, EFE plays an imperative role in augmenting the entrepreneurial failure management skills of college students, supplementing their confidence for re-entrepreneurship, and stimulating proactive entrepreneurial actions through both practical and theoretical courses relevant to entrepreneurial failure (Xu and Zhang, 2021). Reportedly, ER serves as the stress response of individual self-protection under adverse conditions (Tusaie and Dyer, 2004). This research paper advocates that EFE can promote entrepreneurship resilience. Firstly, in the context of self-efficacy theory, EFE catalyzes the emotional resilience of college student entrepreneurs. By instilling self-efficacy in entrepreneurs (Soomro and Shah, 2021), adjusting their cognitive perceptions of failure, and triggering self-motivation mechanisms, EFE enhances their internal motivation and resilience. This not only strengthens individual recovery and endurance but also supports entrepreneurs to adapt to their environments and develop self-transcendence abilities. Secondly, in terms of the emotional theory perspective, EFE optimizes emotional management skills; thereby, fostering ER (Hao et al., 2020). Apparently, entrepreneurs who undergo EFE display the capacity to organize and manage adverse emotions subsequent to entrepreneurial failure (Haddoud et al., 2020). Besides this, EFE equips entrepreneurs with the ability to question and learn; hence, assisting growth and survival in adverse situations (Chimucheka, 2013). In addition, EFE instills an optimistic mental state in entrepreneurs, along with effective frustration-coping abilities. This not only supports their overall resilience and trauma coping mechanisms (Segovia et al., 2012) but also enables them to actively embrace different challenges, view failure as a prospect, and incorporate effective measures to alter the status quo; eventually, strengthening their environmental adaptability (Xiao and Wang, 2022).

The emotions accompanying failure, such as anxiety, grief, fear, and resentment may leave entrepreneurs feeling incapacitated to recover. Though, resolving the challenge of “learning from a fall” is crucial. Parallel to this, actively responding to difficulties, deriving valuable lessons from failures, transforming crises into opportunities, undergoing transformative experiences, and even surpassing previous capabilities are integral components of emotional resilience (Hao et al., 2020). Reportedly, recent studies underscore that entrepreneurs with robust ER exhibit adept resource integration for entrepreneurial activities (Contreras et al., 2017), objectively evaluate entrepreneurial challenges, and demonstrate heightened efforts in subsequent entrepreneurial

pursuits. On the one hand, resilience arises from adversity, whereas entrepreneurial failure serves as the soil for nurturing the genes relevant to ER. Certainly, resilient entrepreneurs hold subjective initiative and dedicate themselves to crisis mitigation (De Mol et al., 2016). In essence, resilience infers that entrepreneurs display unwavering perseverance and skillfully perceive failure as a prospect for learning. Eventually, this enhances their self-efficacy and entrepreneurial motivation, while intensifying their desire to deliver a strong comeback through re-entrepreneurship (Renko et al., 2021). On the other hand, the reconstruction of cognitive perceptions of failure serves as a critical factor affecting the intention for re-entrepreneurship, supported by higher cognitive reconstruction correlated with stronger intentions for re-entrepreneurship (Krueger et al., 2000). The dual setbacks in emotions and finances are the most direct impacts of entrepreneurial failure; thereby, leading to negative and pessimistic entrepreneurial cognition (Yu, 2011). Moreover, entrepreneurs with resilience are capable of regulating undesired emotions, enhancing self-cognition and efficacy, activating the mechanism of self-solving issues, and thereafter impacting the persons' willingness to re-initiate the business (Ukil and Jenkins, 2023; Masten, 2001). Therefore, entrepreneurs who have received EFE exhibit stronger ER, whereas persons with strong ER shall never complain, fear, or give up when experiencing entrepreneurial failure, but become more audacious and actively attempt to commence a new business until finally obtaining success (Ciptono et al., 2023). Based on the aforesaid analysis, this research study proposes that EFE indirectly influences IRE by improving the ER of individuals.

H2. ER plays a mediating role between EFE and IRE.

H2a. EFE significantly enhances ER.

H2b. ER positively promotes IRE.

2.5 The moderating role of regulatory focus

The fundamental principle of regulatory focus theory is that people are guided by their self-regulation system, in order to approach positive results and avoid negative outcomes (Higgins, 1998). This research paper holds that the connection between EFE and IRE shall show differences owing to different types of regulatory focus (Muhammad et al., 2023).

Firstly, entrepreneurs with a promotion-focused orientation display a stronger receptiveness to change and are not constrained by prior experiences (Lieberman et al., 1999). On the one hand, entrepreneurs who have undergone EFE are more inclined to enhance their failure management skills through organizational changes in a promotion-focused state. These individuals perceive change as an opportunity to “revive the dead” (Ciptono et al., 2023); thus, augmenting their IRE (Lieberman et al., 1999). On the other hand, prevention-focused entrepreneurs are likely to maintain a more steadfast preference for preserving the status quo. In a prevention-focused state, entrepreneurs who have undergone EFE resist organizational changes due to distress of the unknown and perceive change as a possible threat (Tseng and Kang, 2009).

Consequently, this resistance not only intensifies the fear of failure but also weakens the linkage between EFE and IRE.

Secondly, a promotion focus boosts a close alignment with goals and cements commitment to those goals. Contrary to this, a prevention focus tends to encourage avoidance of goal misalignment; thereby, weakening commitment to the target (Spiegel et al., 2004). Meanwhile, in a promotion-focused state, entrepreneurs who have undergone EFE are more inclined to enhance their understanding of failure, engage in learning from entrepreneurial failure, and perceive failure as a catalyst for re-entrepreneurship (Kammerlander et al., 2015). Nevertheless, entrepreneurs who have received EFE tend to conform to and be complacent with the current status quo in a prevention-focused state. These entrepreneurs experience challenges in undertaking entrepreneurial reflection; consequently, perceiving failure as an obstacle to re-entrepreneurship (Kammerlander et al., 2015).

Thirdly, promotion focus induces aspirational strategies that concentrate more on identifying and exploiting the advantages of opportunities; while, prevention focus constitutes a vigilant strategy, which stresses the risks brought by prospects (Crowe and Higgins, 1997). Explicitly, promotion-focused entrepreneurs can persevere in the event of entrepreneurial failure, acquire entrepreneurial resources, rebuild entrepreneurial teams, actively identify and make use of entrepreneurial opportunities (Brockner and Higgins, 2001), and expect to “turn defeat into victory”; hence, displaying a higher IRE. Contrarily, prevention-focus-oriented entrepreneurs tend to be cautious and vigilant about giving up entrepreneurial prospects while encountering entrepreneurial failure (Gamache et al., 2015). Further, these individuals are more cautious and sensitive about the possible losses of re-commencing the business; thus, weakening their IRE. On this basis, the below hypotheses are presented in this study:

H3a: Promotion focus plays a positive moderating role in the influential path of EFE on IRE.

H3b: Prevention focus plays a negative moderating role in the influential path of EFE on IRE.

In short, the theoretical model of this study is depicted in Figure 1. Note: (+) represents a positive effect, (-) represents a negative effect.

3 Methodology

3.1 Sample data collection

The compiled questionnaire is based on the established scales developed or employed by researchers such as Zhou (2021), Wu et al. (2021), Chen et al. (1998), Li et al. (2018), Higgins (1998), and Huang (2023). Consistently, the research questions have been modified in conjunction with the specifics of this paper. In specific, the questionnaire design adheres to the principles of scientific rigor, effectiveness, standardization, and reliability. An in-depth process comprising the initial draft, preliminary investigation, and subsequent revisions has been undertaken, in order to ensure the effectiveness and feasibility of the questionnaire (Zhao et al., 2022). There are 4 sub-scales in the final version of the questionnaire, namely: EFE, ER, RF (prevention focus and promotion focus), and IRE, all of which utilize the scoring method of a 5-point

Likert scale. Primarily, this study examines the effect of EFE on the IRE; thereby, concentrating on college student entrepreneurs in China. In accordance with Xie et al. (2017), the survey targets entrepreneurs with prior experience in terms of entrepreneurial failure. Obviously, the questionnaire reports that respondents are required to be college entrepreneurs who have experienced entrepreneurial failure.

Prominently, the questionnaire was distributed by the online questionnaire platform of Wenjuanxing, which represents a famous online questionnaire survey platform in China. The questionnaire was administered through the online platform Wenjuanxing, a well-known survey platform in China. Evidently, distribution happened in 2 stages. In July 2022, the 1st phase involved distributing 700 survey questionnaires covering 4 variables including EFE, ER, promotion focus, and prevention focus. A total of 637 valid questionnaires were recovered over the course. Carried out in July 2023, 637 questionnaires were distributed in the 2nd phase to the respondents from the 1st stage, resulting in 583 valid responses. Notably, demographic details of the respondents reflected that 50.94% of respondents were male whereas 49.06% were female. Further, the distribution across academic years displayed 30.19% freshmen, 27.96% seniors, 22.30% juniors, and 17.84% sophomores. In addition to this, liberal arts, science, and engineering fields accounted for 52.66, 28.82, and 18.52%, respectively.

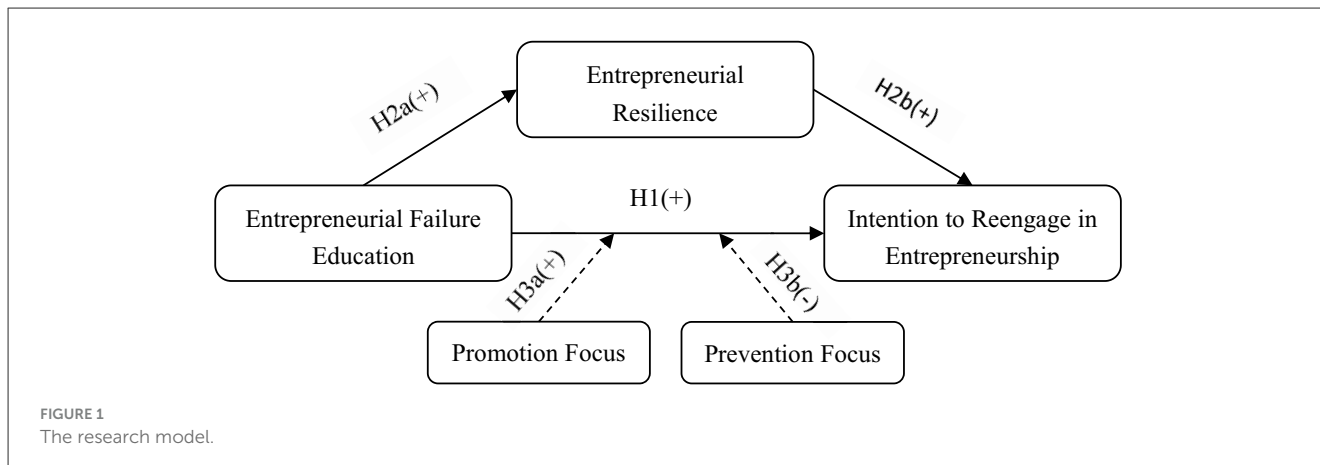
3.2 Instruments

EFE: This paper adopted a scale introduced by Zhou (2021). The content of scale underwent scrutiny by 3 academicians specializing in entrepreneurship. The review encompassed an evaluation of question content, as well as the comprehensiveness and acceptability of each question. Eventually, 5 research questions were selected, such as “I have acquired knowledge and skills in entrepreneurial failure management through the study of an entrepreneurial failure course” and “My college has established a theoretical education course on entrepreneurial failure”.

ER: Using the entrepreneurial resilience (ER) scale proposed by Wu et al. (2021), there are 6 research questions, such as “I am confident to handle most problems in my work and life” and “In order to enrich my life, I often take the initiative to seek changes”.

RF: Referring to Higgins’ (1998) scale (1998) and the implications of Huang (2023), RF encompasses 2 key dimensions, namely: prevention focus (Pre-F) and promotion focus (Pro-F). On the one hand, the promotion focus comprises 7 main items, exemplified by statements such as “I am motivated by my own hopes and ambitions” and “I tend to take risks in my work in order to succeed”. On the contrary, the prevention focus contains 5 items, including statements such as “I concentrate on avoiding failure” and “I make an effort to steer clear of losses at work”.

IRE: Based on the follow-up entrepreneurial intention survey crafted and established by Li et al. (2018) and Chen et al. (1998), the revised scale consists of a set of 5 questions, including statements such as “I maintain an interest in entrepreneurship post-entrepreneurial failure”, “Even if I’ve experienced entrepreneurial



setbacks, I remain prepared to venture into business again”, “I am open to re-entering entrepreneurship despite previous failures”, and “Should the idea to initiate a business resurface, I am committed to pursuing it.”

3.3 Data preparation

3.3.1 Item analysis

In order to ensure the estimation quality in the subsequent outcomes, this research study performed an item analysis on all items within the scale; thereby, eliminating those that did not fulfill predefined standards. In particular, 2 key indicators, namely the critical ratio (CR) and the correlation of each question with the overall score were used for this assessment. [Yang and Yang \(2010\)](#) report that the respective item should be retained when a CR exceeds 3 and attains statistical significance; otherwise, consideration should be given to eliminating or modifying the item. Besides, questions with correlation coefficients below 0.4 with the total score were recommended for deletion or modification, as highlighted by [Wu \(2018\)](#).

Succeeding the variable-specific analysis, all 6 questions of the EFE scale, 6 questions of the ER scale, and 5 questions of the IRE scale met the criteria and were retained. Though, 1 question related to prevention focus and 2 questions associated with promotion focus did not meet the standard threshold on the regulatory focus scale. As a consequence, these items were deleted due to their failure to reach the 0.4 correlation threshold with the total score. Thus, the regulatory focus scale, post-deletion comprises 9 items less than the original version.

3.3.2 Exploratory factor analysis (EFA)

As a multivariate statistical method, EFA stands as a pivotal tool in the development and validation of psychological theories and estimations ([Watkins, 2018](#); [Wang et al., 2023](#)). Aligned with [Segura et al. \(2017\)](#), factor analysis becomes viable only when the KMO value of the scale stands at ≥ 0.70 . Similarly, Wu stipulates that the factor loading of each item in EFA should surpass 0.5, whereas a cumulative explanatory variation of $> 50\%$ confirms the sound validity of the scale ([Wang et al., 2023](#)).

In this study, the EFA outcomes for each variable are outlined as follows: the KMO value for the EFE scale is documented to be 0.857 ($p = 0.000$), with item factor loadings ranging between 0.676 to 0.791 and an explanatory variation of 52.096%. Furthermore, the ER scale yielded a KMO value of 0.721 ($p = 0.000$), with item factor loadings spanning from 0.723 to 0.870 and an explanatory variation of 68.130%. Additionally, the promotion focus scale delivered a KMO value of 0.798 ($p = 0.000$), featuring item factor loadings spanning from 0.627 to 0.761, with an explanatory variation of 51.055%. In terms of the prevention focus scale, the KMO value is reported to be 0.720 ($p = 0.000$), with item factor loadings ranging from 0.718 to 0.770 and an explanatory variation of 55.096%. Finally, the IRE scale demonstrated a KMO value of 0.817 ($p = 0.000$), with item factor loadings dispersed from 0.700 to 0.784, and an explanatory variation of 53.859%.

3.3.3 Common method variance (CMV) test

Since the sample data were self-reported, a comprehensive assessment was undertaken using Harman univariate testing, in order to ensure the quality of data gathering ([Wang et al., 2023](#)). The test outcomes disclosed a Kaiser–Meyer–Olkin (KMO) value of 0.945; thereby, surpassing the acceptable threshold of 0.8. Meanwhile, Bartlett’s test of sphericity was highly significant ($p < 0.001$). Afterward, 5 non-rotational factors were extracted, with the 1st factor displaying an explanatory power of 34.310%. The proposed value falls below the critical threshold of 50%. This indicates that the CMV issue was not significantly pronounced in this study.

4 Results

4.1 Reliability and validity

Use SPSS 25.0 to calculate the reliability and validity of the scale. Firstly, the Cronbach’s α values for EFE, ER, prevention focus, promotion focus, and IRE were 0.813, 0.734, 0.728, 0.759, and 0.783, respectively, all exceeding 0.7. This reflects a high level of internal consistency as well as reliability within the scale.

Secondly, both discriminative validity and aggregate validity of the scale were assessed by the authors. In the meantime, aggregation

validity was analyzed using the average variance extracted (AVE) values and composite reliability (CR). As illustrated in Table 1, the AVE values for EFE, ER, promotion focus, prevention focus, and IRE stood at 0.521, 0.666, 0.511, 0.551, and 0.539, all surpassing the 50% threshold. Moreover, discriminative validity was anticipated by comparing the square root of the AVE of latent variables with the correlation coefficients between the corresponding latent variables. Particularly, the square root of the AVE for each variable exceeded the respective correlation coefficient (the diagonally bolded data in Table 1 presents the square root of the AVE for each variable); thereby, indicating robust discriminative validity. Thus, the scale demonstrates sound validity.

4.2 Descriptive statistics and correlations analyses

Table 1 depicts that EFE is positively associated with IRE ($\beta = 0.540, p < 0.05$), EFE is positively related to ER ($\beta = 0.431, p < 0.05$), and ER is positively correlated with IRE ($\beta = 0.525, p < 0.05$). Preliminarily, the outcomes of correlation analysis test the rationality of the research hypothesis.

4.3 Main effect test and mediating effect test

In this paper, stepwise regression analysis was undertaken to ascertain the theoretical hypotheses. Correspondingly, the derived results are populated in Table 2. EFE exerted a strongly positive and significant influence on the IRE (M8: $\beta = 0.537, p < 0.001$); thereby, validating hypothesis H1. In addition, EFE displayed a significant positive impact on the ER (M2: $\beta = 0.430, p < 0.001$). Eventually, ER, exerted a significant positive effect on the IRE (M9: $\beta = 0.522, p < 0.001$). The regression coefficient of EFE on IRE remained significant (M10: $\beta = 0.383, p < 0.001$) but notably decreased, upon the introduction of the mediating variable ER. The proposed downfall reveals that ER partially mediates the correlation between EFE and IRE. Resultantly, H2 is presumed to be supported in this study; thus, highlighting the partial mediating role of ER in the linkage between EFE and IRE.

4.4 Moderating effect test

Table 2 establishes that the interaction term between EFE and promotion focus documents a positive effect on the IRE (M5: $\beta = 0.268, p < 0.001$). This suggests that a stronger promotion focus intensifies the impact of EFE on IRE. Alternatively, promotion focus positively moderates the connection between EFE and IRE. It can be supposed that hypothesis H3a is supported in this paper. In contrast to this, the interaction term of EFE and prevention focus negatively affected IRE (M6: $\beta = -0.112, p < 0.01$). This indicates that the stronger the prevention focus, the weaker the effect of EFE on IRE, implying that a negative focus on prevention moderates the association between EFE and IRE. Therefore, it is assumed that hypothesis H3b is accepted in this study.

4.5 Robustness test

Firstly, the Bootstrap method is utilized to determine the robustness of the mediating impact of ER. The sample size is 5000, and the relevant results are illustrated in Table 3. Evidently, a positive linkage is observed between EFE and IRE ($\beta = 0.365, P < 0.001$), with ER serving as a partial intermediary between EFE and IRE (indirect effect value stands at 0.147, 95% confidence interval [0.109, 0.193], excluding 0). This reaffirms the support for hypotheses H1 and H2.

Secondly, the Bootstrap method is applied to validate the robustness of the GF's regulatory effect (pro-f and pre-f). With a sample size of 5000, the test outcomes are presented in Table 4. In specific, the interaction coefficient between EFE and pro-f happens to be significant ($\beta = 0.242, p < 0.001$), with a 95% confidence interval [0.161, 0.323], excluding 0. Noticeably, the indirect effect remains significant at high pro-f ($r = 0.465$, BootLCI [0.370, 0.561]) whereas this effect is significant when pro-f is low ($r = 0.194$, BootLCI [0.117, 0.272]). This further substantiates hypothesis H3a. On the same note, the interaction term coefficient between EFE and pre-f stands significant ($\beta = -0.208, p < 0.001$), with a 95% confidence interval [-0.297, -0.118], excluding 0. Simultaneously, the indirect effect is significant when pre-f is low ($r = 0.377$, BootLCI [0.292, 0.462]) and also at high pre-f ($r = 0.130$, BootLCI [0.043, 0.217]); thereby, providing additional confirmation for hypothesis H3b.

5 Discussion

5.1 Theoretical contributions

Firstly, this research study contributes to the comprehension of the effect of EFE on the IRE of college students; consequently, expanding beyond the extant literature. Although a large number of studies have explored how entrepreneurship education affects the entrepreneurial intention of students (Imran et al., 2022; Huang, 2023; Melsalasa et al., 2023), limited attention has been assigned to the relationship between EFE and college students' IRE. This paper contends that enhancing the willingness of student entrepreneurs to initiate new ventures holds significant value in resolving employment challenges and fostering the right entrepreneurial mindset, given the high failure rates in student entrepreneurship (Xu and Zhang, 2021; Ding et al., 2016; Hao et al., 2020; Testa and Frascheri, 2015). EFE recognized as a vital facet of entrepreneurship education, has garnered sufficient attention from research scholars such as Yu et al. (2012), Chen and Zhang (2015), Xu and Zhang (2021), and Tang and Shi (2023). These researchers advocate for establishing an EFE curriculum within higher education institutions, in order to instill entrepreneurial values, the courage to embrace failure, and a resilient spirit in confronting challenges; ultimately, enhancing the IRE of college students. Resultantly, this conclusion not only expands the theoretical comprehension and empirically ascertains the linkage between entrepreneurship education and entrepreneurial intention but also extends a viable pathway for students to reignite entrepreneurial endeavors while realizing sustainable entrepreneurship post-failure.

TABLE 1 Correlation analysis among the variables.

Variable	Mean	SD	EFE	ER	Pro-F	Pre-F	IRE
EFE	4.059	0.539	0.722				
ER	3.874	0.662	0.431**	0.816			
Pro-F	4.130	0.560	0.588**	0.497**	0.715		
Pre-F	4.058	0.595	0.498**	0.429**	0.454**	0.742	
IRE	4.310	0.511	0.540**	0.525**	0.520**	0.550**	0.734

*p < 0.05.
 **p < 0.01.
 (2-Tailed Test).

TABLE 2 Regression analysis results.

Variables	ER		IRE							
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Gender	-0.057	-0.035	-0.068	-0.073	-0.075*	-0.074*	-0.097	-0.069	-0.067	-0.057
Grade	0.017	0.012	-0.090	-0.048	-0.104**	-0.039	-0.075	-0.081	-0.084	0.085
Major	0.014	-0.005	0.015	0.017	0.010	0.017	0.031	0.008	0.024	0.010
EFE		0.430***	0.352***	0.353***	0.411***	0.352***		0.537***		0.383***
ER									0.522***	0.357***
Pro-F			0.314***		0.425***					
Pre-F				0.369***		0.333***				
Pro-F×EFE					0.268***					
Pre-F × EFE						-0.112**				
ΔR ²	0.003	0.187	0.368	0.404	0.416	0.416	0.016	0.304	0.288	0.407
F	0.669	33.334***	67.187***	78.368***	68.355***	68.261***	3.215*	62.992***	58.424***	79.304***

* p < 0.05.
 ** p < 0.01.
 *** p < 0.001.

Secondly, this study elucidates the internal logic of ER between EFE and IRE of college students. Primarily, prior literature focuses on exploring the mediating mechanism between entrepreneurship education and entrepreneurial intention, involving entrepreneurial behavior cognition (Zhang et al., 2018), entrepreneurial self-efficacy (Imran et al., 2022), entrepreneurial values (Huang, 2023), and entrepreneurial orientation (Melsalasa et al., 2023). Though, there exist few relevant studies to illuminate the indirect association between EFE and IRE. This paper points out that ER serves as a ‘bridge’ between EFE and IRE of college students; thereby, acting as a mediator in the proposed association. Referring to Bandura’s theory of self-efficacy, self-efficacy significantly explains the ER (Ciptono et al., 2023). In turn, EFE equips college entrepreneurs with both theoretical and practical knowledge of entrepreneurial failure; thus, augmenting their capacity to navigate setbacks and enhancing their entrepreneurial efficacy (Soomro and Shah, 2021). Meanwhile, entrepreneurs with robust resilience are able to distill experiences, objectively evaluate internal and external environments, and improve foresight in entrepreneurial decision-making (Zhao et al., 2022). Further, resilient entrepreneurs demonstrate a formidable ability to withstand setbacks; thereby, retaining unwavering confidence and optimistic entrepreneurial expectations for the future (Nsereko, 2020). As a result, the

study findings not only expand the present understanding of the mediating mechanisms between entrepreneurial education and entrepreneurial intention but also fill the gap in comprehending the mediating mechanism between EFE and IRE.

Thirdly, this research study delves into the regulatory mechanism of RF between EFE and IRE. Previous studies have lacked the exploration into the regulatory mechanism between EFE and IRE. However, extant literature has scrutinized the regulation mechanism of multiple factors such as sensory seeking between failure feedback and IRE (Simmons et al., 2023), social support between cognitive flexibility and IRE (Zhao et al., 2022), and psychological capital between entrepreneurship education and the willingness to re-commence the business (Wang et al., 2023). This paper establishes that RF displays different moderating influences on the correlation between EFE and IRE. On the one end, promotion focus positively regulates the association between EFE and IRE; while, on the other end, prevention focus negatively impacts this connection. Driven by a strong ambition for entrepreneurial success, entrepreneurs with a promotion-focused orientation tend to link the knowledge, abilities, and cognitive insights gained through EFE with their pursuit of entrepreneurial success. Likewise, entrepreneurs develop stronger confidence in transforming setbacks into victories by reinforcing

TABLE 3 Summary of mediation analysis based on the Bootstrap method.

Mediation path	Direct effect			Indirect effect		
	Effect size	Lower	Upper	Effect size	Lower	Upper
EFE → ER → IRE	0.365	0.298	0.432	0.147	0.109	0.193

TABLE 4 Summary of moderating analysis based on the Bootstrap method.

Regulating path	Interaction coefficient	Lower	Upper	Regulating effect under different conditions				
				Moderator	Effect	SD	Lower	Upper
Pro-F: EFE→IRE	0.242	0.161	0.323	Low	0.194	0.040	0.117	0.272
				High	0.465	0.049	0.370	0.561
Pre-F: EFE→IRE	−0.208	−0.297	−0.118	Low	0.377	0.043	0.292	0.462
				High	0.130	0.044	0.043	0.217

reflection and learning from failure experiences; thereby, boosting their willingness to again venture into business. Contrarily, entrepreneurs oriented toward prevention focus are more likely to negatively perceive entrepreneurial failure due to their cautious attitude toward failure. Using the knowledge, skills, and understanding acquired from EFE, it is difficult to appropriately interpret entrepreneurial setbacks. The conservative mindset of such entrepreneurs leads to more risk-averse practices, thereafter, diminishing the likelihood of re-engaging in entrepreneurial endeavors (Li and Dong, 2014). Therefore, the incorporation of RF broadens the psychological context of the EFE mechanism on the IRE. This integration adeptly merges internal psychological mechanisms with the external learning processes; thereby, excavating the exploration of the combined effect of internal and external factors on the IRE of college entrepreneurs.

5.2 Practical implications

Firstly, EFE has evolved into an indispensable tool for college students again venturing into businesses. In light of this, universities and colleges need to transit to providing students with a comprehensive EFE system from the conventional “success-oriented” utilitarian entrepreneurial education model (Xu and Zhang, 2021). The stated system encompasses both practical and classroom teachings of EFE, along with the establishment of entrepreneurship incubation centers within educational institutions and higher education bodies. Such an approach aids students in acquiring a holistic comprehension and mastery of psychological knowledge, professional expertise, and business skills associated with entrepreneurial failure (Lattacher and Wdowiak, 2020; Zhang, 2018). The intent is to nurture entrepreneurial, innovative, and creative talents; consequently, fostering an innovative spirit and molding their entrepreneurial character. Eventually, this provides students with the essential spiritual, knowledge, and ability support for future entrepreneurial endeavors. Particularly, the establishment of EFE in universities and colleges is crucial. On the one hand, EFE helps aspiring student entrepreneurs develop an accurate and scientific perspective on entrepreneurial failure; thus, instilling entrepreneurial values and

empowering them with problem-resolving and prospect-finding skills, in order to encourage further business ventures. On the other hand, this approach attempts to develop a robust knowledge base and psychological resilience; thereby, alleviating the pressure and setbacks triggered by entrepreneurial failure. On this basis, the researchers seek to restore entrepreneurial passion and motivation; thereby, increasing both ER and IRE (Huang, 2023).

Secondly, ER has emerged as a vital skill for college entrepreneurs seeking to embark on new business ventures (Zhang and Li, 2020). Besides EFE, entrepreneurs must also exhibit the capabilities and qualities associated with ER, perceiving entrepreneurial setbacks as valuable learning experiences (Xie and Liang, 2016). There is a need to systematically investigate the internal logic and insights gained from entrepreneurial failures; thereby, supporting entrepreneurial resilience, overall confidence, and self-efficacy. In the realm of entrepreneurial practice, past failures largely diminish the self-efficacy and enthusiasm of entrepreneurs from both economic and psychological standpoints. Consequently, there is a substantial need for entrepreneurs to nurture ER; thus, extending pivotal psychological and resource support for further entrepreneurial endeavors (Zhao et al., 2022). In the meantime, entrepreneurs should proactively extract lessons from entrepreneurial failures by facilitating the conversion of negative emotions into positive sentiments, engaging in effective negative emotional management, and offering constructive psychological reinforcement for restarting. Concurrently, entrepreneurs must enrich their comprehension of entrepreneurial failure, optimize resource utilization, bolster environmental adaptability, and fortify resilience against adversity through the application of EFE (Sachdev, 2023). This approach equips entrepreneurs with dynamic capabilities and the intrinsic motivation required to initiate new business ventures.

Thirdly, entrepreneurs should cautiously assume the role of RF in the association between EFE and IRE. Owing to varied focus orientations, entrepreneurs most often approach decision-making with a biased viewpoint, as reported by Gu et al. (2021). Prominently, entrepreneurs inclined toward promotion focus tend to be optimistic regarding entrepreneurial opportunities while fervently seeking success, occasionally overlooking possible risks

and making impulsive decisions. On the contrary, prevention-focused entrepreneurs display a more conservative cognitive approach, tending to outright reject risky decision-making behaviors (Brockner et al., 2004). Indeed, entrepreneurship among college students is an activity filled with extremely high levels of risk and a significant amount of uncertainty (Yu and Pu, 2018). Entrepreneurs with different regulatory focus orientations differently perceive risks, circumstances, and opportunities; thereby, resulting in distinct preferences in entrepreneurial decision-making (Hao et al., 2020). Further, entrepreneurs with a promotion focus are more inclined to integrate the knowledge and skills derived from EFE with entrepreneurial opportunities. Such individuals reflect a stronger psychological expectation of “turning failure into success” and a higher willingness to again seek entrepreneurship. Contrarily, entrepreneurs with a prevention focus, being cautious regarding entrepreneurial opportunities, find it difficult to translate EFE into the motivation for a renewed entrepreneurial intent.

5.3 Recommendations for public policies and educational programs

In terms of promoting Entrepreneurial Failure Education (EFE) through systematic policy frameworks, EFE should be integrated into the national college entrepreneurship education system, and mandatory guidelines should be issued, requiring all universities that offer entrepreneurship-related courses to provide at least 2–3 credit-bearing EFE courses, such as Cognition of Entrepreneurial Failure and Resource Reorganization after Failure. Meanwhile, special funds accounting for 15%–20% of the annual college entrepreneurship support budget should be allocated to support the development of EFE courses and the construction of virtual simulation platforms for failure scenario training—these platforms can simulate scenarios like cash flow crises and market expansion failures. Additionally, a “University EFE Evaluation System” should be established, linking the effectiveness of EFE implementation (e.g., student participation rate, the improvement of Intention to Reengage in Entrepreneurship (IRE) after completing courses) to universities’ access to national entrepreneurship education awards and resource allocation. This linkage serves to incentivize universities to prioritize the development of EFE. In EFE-related policies, priority should be given to the cultivation of Entrepreneurial Resilience (ER). A “National Entrepreneurial Resilience Training Program” can be launched for college students with entrepreneurial failure experience, and cooperation with industry associations (e.g., Association of Small and Medium Enterprises) can be carried out to provide off-campus practical training, helping students develop ER in real business scenarios. At the same time, support should be given to the establishment of “Inter-University ER Research Centers” to develop standardized ER assessment tools covering dimensions such as emotional resilience and resource reorganization ability, and to provide college students with free ER testing and personalized improvement plans. When formulating “focus-oriented” EFE promotion strategies, it is necessary to first identify students’ regulatory focus types through

pre-enrollment regulatory focus assessments. For students with a promotion focus, EFE should be positioned as a “tool for seizing re-entrepreneurship opportunities”—for example, by highlighting cases where students identified new market gaps through EFE. For students with a prevention focus, EFE should be framed as a “risk mitigation measure”. Meanwhile, support should be provided for the implementation of “Cross-University Regulatory Focus Guidance Projects”, where experts in psychology and entrepreneurship train college counselors to help them identify students’ regulatory focus types and provide personalized EFE guidance. For instance, counselors can encourage students with a prevention focus to start with low-risk re-entrepreneurship projects after receiving EFE.

At the level of educational programs, an EFE system should be constructed following the principles of modularization, strong integration, and differentiation to replace the traditional success-oriented entrepreneurship education (TEE). First, a modular EFE program should be designed. The theoretical module teaches McGrath’s “Falling Forward” theory and failure attribution methods, helping students distinguish between controllable and uncontrollable failure factors and avoid cognitive biases such as “failure stigma”. The practical module organizes “Entrepreneurial Failure Sharing Sessions” where serial entrepreneurs with experiences of bouncing back from failure are invited to share their insights; it also establishes on-campus entrepreneurship incubation centers with a “failure tolerance mechanism” to provide students with small-scale funding for testing re-entrepreneurial ideas, with failure having no impact on their academic evaluations. The emotional regulation module collaborates with psychology departments to offer group counseling for students who have experienced entrepreneurial failure, teaching them “grief oscillation regulation” techniques to alleviate negative emotions and rebuild entrepreneurial confidence. On this basis, entrepreneurial resilience (ER) training should be deeply integrated into EFE courses. On one hand, “Post-Failure Resource Integration Workshops” should be offered, allowing students to practice reorganizing existing resources after simulating entrepreneurial failure scenarios to enhance their adaptability to setbacks. On the other hand, a mentorship program should be implemented, assigning “Dual Mentors” to each student with entrepreneurial failure experience. Through one-on-one guidance, the mentors help students transform the knowledge gained from EFE into entrepreneurial resilience, such as assisting them in developing a “failure response plan” to clarify the measures to be taken when re-entrepreneurship encounters obstacles. Meanwhile, differentiated teaching should be implemented in EFE based on students’ regulatory focus types. For students with a promotion focus, “Opportunity Exploration Workshops” should be designed to guide them to use the knowledge learned from EFE to analyze failure cases and develop innovative re-entrepreneurial plans; “Re-Entrepreneurship Pitch Competitions” should also be held to reward bold and creative ideas. For students with a prevention focus, “Risk Assessment and Control Courses” should be added to EFE curricula to teach them how to conduct market risk surveys and develop contingency plans before re-entrepreneurship; “Low-Risk Practice Projects” should be arranged to help them build confidence through small successes. This multi-dimensional educational design not only consolidates

students' foundational understanding of and ability to respond to entrepreneurial failure but also accurately meets the developmental needs of students with different psychological traits, helping them cultivate core entrepreneurial competencies.

5.4 Limitations and future direction

There are certain limitations related to this study but directions are extended for future research. Firstly, the theoretical framework of this paper introduces ER into the correlation between EFE and IRE. This research study discloses the mediating mechanism of ER in this linkage while taking into account different dimensions such as optimism, adaptability, and confidence. Future studies could further scrutinize the mediating role of different dimensions of ER in the connection between EFE and IRE. Secondly, the study sample only consisted of college students in China, and it is not certain whether the same outcomes can be generalized to other cultural contexts. Hence, further analysis in different settings is essential, in order to test the generalizability of study findings. Thirdly, though this paper recommends that ER serves as an indirect mediator between EFE and the intention for IRE, there may exist other pathways and contextual factors affecting the influence of EFE on IRE. Therefore, future research studies should explore diverse mediators and moderating variables, in order to further explain the relevant mechanisms and boundary conditions of the impact of EFE on IRE.

6 Conclusion

This study empirically examines how Entrepreneurial Failure Education (EFE) influences University Students' Intention to Reengage in Entrepreneurship (IRE), with a focus on the mediating role of Entrepreneurial Resilience (ER) and the moderating role of regulatory focus. By analyzing two-wave survey data from 583 Chinese university students with prior entrepreneurial failure experience, this research addresses critical gaps in the literature and delivers actionable insights for theory and practice.

Firstly, the findings confirm that EFE exerts a significant positive direct impact on IRE ($\beta = 0.537, p < 0.001$), validating that systematic failure education effectively fosters students' willingness to restart entrepreneurial ventures after setbacks. This aligns with experiential learning theory, as EFE's emphasis on failure reflection and skill acquisition directly addresses the knowledge deficits left by traditional success-oriented entrepreneurship education. Second, ER plays a partial mediating role in the EFE-IRE relationship: EFE significantly enhances ER ($\beta = 0.430, p < 0.001$), which in turn promotes IRE ($\beta = 0.522, p < 0.001$), and the direct effect of EFE on IRE weakens but remains significant ($\beta = 0.383, p < 0.001$) after controlling for ER. This finding clarifies the "black box" of how EFE translates into re-entrepreneurial motivation by highlighting resilience as a key transmission channel. Third, regulatory focus moderates the EFE-IRE link: promotion focus strengthens the association ($\beta = 0.268, p < 0.001$), while prevention focus weakens it ($\beta = -0.112, p < 0.01$), revealing critical boundary conditions that shape EFE's effectiveness.

Theoretical contributions of this study are threefold. First, it integrates three fragmented perspectives on ER—psychological trait theory, dynamic interaction theory, and contextualized capability-building theory—into a unified framework, defining ER as a combination of stable psychological attributes and acquirable situational skills. This integration resolves contradictions in existing literature and provides a holistic understanding of how EFE cultivates resilience. Second, it enriches the literature on entrepreneurial failure learning by establishing a "EFE→ER→IRE" mechanism, complementing prior research that rarely links failure education to post-failure re-engagement intentions. Third, it extends regulatory focus theory to the entrepreneurial failure context, demonstrating how individual motivational orientations shape the effectiveness of educational interventions, a dimension understudied in entrepreneurship education research.

In summary, this study advances understanding of EFE's role in fostering university students' post-failure re-entrepreneurial intentions and provides evidence-based guidance for building a more resilient entrepreneurial ecosystem. By highlighting the critical role of resilience and regulatory focus, it offers a roadmap for transforming entrepreneurial failure from a deterrent into a catalyst for sustainable entrepreneurial development.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/supplementary material.

Ethics statement

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

Author contributions

LM: Data curation, Investigation, Project administration, Visualization, Writing – original draft. YW: Conceptualization, Data curation, Formal analysis, Software, Writing – original draft. JW: Conceptualization, Methodology, Supervision, Validation, Writing – review & editing. YC: Conceptualization, Project administration, Supervision, Writing – original draft. HY: Data curation, Investigation, Project administration, Writing – original draft.

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Conflict of interest

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

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This article has been corrected with minor changes. These changes do not impact the scientific content of the article.

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