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RESEARCH ARTICLE

The effect of entrepreneurial leadership on college students' creativity: the mediating role of intrinsic motivation and emotional intelligence

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ABSTRACT

The purpose of this study is to explore the influence of entrepreneurial leadership perceived by college students in Northwest China on their creativity, focusing on the mediating role of intrinsic motivation and emotional intelligence in this relationship. Through the questionnaire survey and structural equation model analysis of 484 college students, the results show that entrepreneurial leadership significantly promotes the creativity of college students, and intrinsic motivation and emotional intelligence play a part in the mediation of this process. In addition, factors such as positive personality and gender have a moderating effect on the relationship between entrepreneurial leadership and creativity. This study provides a new theoretical perspective for the relationship between leadership and creativity in entrepreneurship education, and provides empirical support for universities to formulate more effective entrepreneurship education strategies.

Keywords: Entrepreneurial leadership, creativity, intrinsic motivation, emotional intelligence, positive personality, gender regulation, entrepreneurial education, Northwest Region

1. Introduction

In today's era of globalization and a knowledge-driven economy, entrepreneurial endeavors have emerged as a crucial catalyst for advancing social and economic growth, fostering employment opportunities, and spurring innovation. College students, as one of the most dynamic groups with innovative potential, have received increasing attention from all walks of life for the cultivation of their entrepreneurial willingness and creativity. Especially in northwest China, with the continuous optimization of educational resources and the continuous support of entrepreneurship policies, college students' entrepreneurship has become a new engine for regional economic development[1]. Nonetheless, determining the most effective methods to bolster entrepreneurial leadership among college students and subsequently stimulate their creative growth remains a subject that requires further comprehensive investigation.

Entrepreneurial self-efficacy, defined as an individual's confidence in their ability to perform entrepreneurial tasks, is widely acknowledged as a pivotal element in boosting entrepreneurial motivation and intention[2]. Studies have underscored the critical role of self-efficacy within the entrepreneurial sphere, particularly from a domain-specific viewpoint, highlighting its significance in accurately predicting

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entrepreneurial intentions and behaviors. Additionally, intrinsic motivation, the internal drive that compels individuals to pursue creative activities, is essential for unlocking the creative potential of college students[3]. Furthermore, emotional intelligence, which encompasses the ability to manage emotions and interpersonal relationships, is equally vital for fostering a positive innovation climate and enhancing team creativity.

The research question of the study is: How does perceived entrepreneurial leadership affect creativity among college students, and what roles do intrinsic motivation and emotional intelligence play as mediating factors in this relationship? **The study specifically focuses on college students in Northwest China, exploring the influence of entrepreneurial leadership within the unique socio-cultural and educational context of the region.**

This study focused on the influence of college students' perception of entrepreneurial leadership on creativity, and incorporated internal motivation and emotional intelligence (EQ) into the analytical framework. Incorporating the cultural backdrop and educational practices of Northwest China, this study investigated how cultural factors might influence the entrepreneurial aspirations and creativity of college students. Additionally, it examined the mediating effects of intrinsic motivation and emotional intelligence in the relationship between entrepreneurial leadership and creativity[4]. In addition, this study will also reveal the commonalities and differences of college students' entrepreneurial psychology under different cultural backgrounds through cross-cultural comparison and empirical analysis. By systematically analyzing the complex relationship among entrepreneurial leadership, intrinsic motivation, emotional intelligence and creativity, this study aims to provide empirical basis for formulating more targeted entrepreneurial education policies, and provide theoretical support and practical guidance for optimizing entrepreneurial education and stimulating creativity of college students. This study will not only help to enrich and improve the theoretical system in the field of entrepreneurial leadership and creativity, but also provide strong support and guidance for promoting college students' entrepreneurial activities in northwest China and even nationwide.

By focusing on the unique socio-cultural and educational context of Northwest China, this research fills a gap in the existing literature and offers new empirical insights that can guide the development of more effective entrepreneurship education strategies. Furthermore, the study extends current theories by incorporating demographic factors such as gender and age, offering a comprehensive framework for understanding how entrepreneurial leadership can foster creativity across diverse student populations.

2. Review of existing studies and proposed frameworks: leadership dynamics, inherent motivation, emotional acumen, and innovative thinking

The concept of self-efficacy is particularly important when exploring entrepreneurial leadership trends in educational centers in Northwest China (covering the core cities of Xi'an, Lanzhou, and Urumqi). Self-efficacy, as an individual's underlying beliefs about his or her own abilities in complex entrepreneurial environments, is critical in influencing entrepreneurial intentions[5]. Particularly noteworthy is that Bandura's research insights on the domain specificity of self-efficacy provide a solid theoretical foundation for accurately predicting entrepreneurial intentions and deeply dissecting diverse patterns of entrepreneurial behavior. Current academics generally agree that self-efficacy serves as the core force driving entrepreneurial motivation and intention[6]. Under this theoretical framework, scholars have continued to innovate and integrate self-efficacy with Ajzen's theory of planned behavior and Shapero's entrepreneurial event model to deepen the understanding of self-efficacy and revolutionize the modeling methodology.

The primary aim of this research model is to enhance understanding of how university entrepreneurial leadership, both directly and indirectly, fosters the growth of students' creativity—an essential driver of

sustainable socio-economic prosperity and the development of an innovative ecosystem in the region. In recent years, academia has increasingly recognized the critical role of self-efficacy in shaping individuals' positive attitudes towards entrepreneurial activities, guiding them to view entrepreneurship as a significant career path. Bagheri, affirm this view. Additionally, Piperopoulos and Dimov's research underscores the centrality of self-efficacy in stimulating entrepreneurial goal-setting and persistent pursuit, providing substantial and multi-dimensional evidence to support the theoretical assumptions of this study.

In a cross-cultural study of 1,000 university students in Canada, the United States, the United Kingdom, Italy and China, academics revealed that students' overall attitudes toward entrepreneurship were comparable despite significant differences between cultures. Although cultural and social factors influence students' entrepreneurial attitude to some extent, their role is relatively limited, and students' self-efficacy significantly becomes a key indicator to measure their willingness to pursue their entrepreneurial goals. In addition, Isiwu and Onwuka focus on the psychological drivers of female entrepreneurial aspirations. Their research reveals that, among various psychological variables, self-efficacy stands out as the pivotal factor influencing women's pursuit of entrepreneurial aspirations. This discovery offers a fresh lens for comprehending the gender disparities in entrepreneurial motivation.

2.1 Innovative thinking and emotional acumen within the realm of entrepreneurial leadership

Creativity is central to entrepreneurship and innovative thinking, especially important in identifying entrepreneurial opportunities and fostering innovative thinking in educational environments, and is significantly represented in Northwest China[7]. At the same time, the continuing influence of Schumpeter's theory reaffirms creativity as an indispensable prerequisite for entrepreneurship and entrepreneurial intent. In the current education system, the cultivation of college students' creative thinking has received increasing attention. Demonstrated that peer encouragement plays a crucial role in enhancing entrepreneurial intentions. They highlighted that a supportive peer environment can greatly magnify the impact of creativity on entrepreneurial pursuits[8]. This provides a new perspective and inspiration for the cultivation of entrepreneurship.

Entrepreneurial leadership profoundly shapes the evolution of creative thinking. Jung described in his latest work that leaders who are pioneering, adventurous and highly motivated can effectively stimulate and promote the creative performance of team members. In-depth research further illustrates how such leaders carefully construct and maintain an organizational environment that encourages innovation and fosters creativity. In addition, the intricate interaction between creativity and emotional intelligence (EI) cannot be ignored[9]. Recent studies indicate that emotional intelligence is crucial for adeptly handling emotions, directly influencing the caliber and results of creative endeavors. This point of view is particularly important and has practical guiding significance in the context of Northwest China, a region with multi-cultural interweaving and strong academic atmosphere.

The study for Northwest cities clearly indicates that intrinsic motivation and emotional intelligence as significant elements significantly enhance the role of entrepreneurial leadership in driving creativity[10]. Thus, the current education system in the Northwest demonstrates a high degree of synergy between entrepreneurial leadership, creativity, intrinsic motivation and emotional intelligence. This trend coincides with the most cutting-edge views and research findings in education, which together reveal that leadership styles have a profound impact on the development of student creativity in a multicultural and intertwined academic environment.

In a recent investigation, Zampetakis identified that self-perceived creativity and familial support positively influence entrepreneurial tendencies[11]. Interestingly, involvement in entrepreneurial projects

diminishes this correlation. These findings enhance comprehension of entrepreneurial motivation by illustrating the complex interplay among various factors in shaping entrepreneurial intentions.

The study reveals the intrinsic relationship between creativity and entrepreneurial intentions, emphasizing the moderating role of multiple factors such as self-efficacy and perceived desirability, as well as the mediating role of self-efficacy and the centrality of creativity and entrepreneurial enthusiasm[12]. Further research consolidates the position of self-efficacy as a bridge between creativity and entrepreneurial inclination, showing the important role of entrepreneurial leadership. In a multicultural context, a deeper understanding and grasping of the mechanisms involved is crucial in shaping students' creativity and entrepreneurial intentions[13].

2.2 Proactive Personality and Entrepreneurial Leadership

The proactive personality is seen as having a central place in the body of theories, and its main characteristic is that it shows positive feedback to external stimuli, a trait that is considered to be of paramount importance. Defined by Bateman and Grant, a proactive personality underscores the individual's constructive influence on their surroundings. Studies indicate that this trait strongly correlates with job performance, career achievements, and creativity, particularly within entrepreneurial education settings. Grant's analysis suggests that a proactive personality significantly enhances college students' inclination towards entrepreneurship[14]. In northwest China, this trend is particularly obvious, where aggressive leaders and proactive individuals achieve each other, forming a virtuous circle. Therefore, when cultivating future entrepreneurs, educators should attach importance to the cultivation of proactive personality in order to stimulate students' creativity and entrepreneurial potential.

With the increasing recognition of emotional intelligence (EI) in the field of entrepreneurial leadership, its ability to supplement proactive personality and strengthen the influence of creativity and innovation has become increasingly prominent. Recent studies by Gupta and Bhawe underscore the pivotal role of emotional intelligence (EI) in achieving positive outcomes in challenging academic settings, such as the dynamic and diverse environment found in Northwest China[15]. Given the strong emphasis on predictive educational approaches in Northwest China and the need for comprehensive exploration of how entrepreneurial leadership influences student creativity, integrating perspectives on proactive personality and EI offers a robust theoretical foundation for analyzing how creativity and entrepreneurial intentions are nurtured among college students in this region[16]. This framework not only aligns with cutting-edge educational theories but also provides deep insights into the socio-cultural dynamics unique to the academic landscape of Northwest China.

Proactive personality plays a pivotal role in predicting entrepreneurial intentions, with recent research highlighting its correlation with entrepreneurial leadership and creativity, particularly within educational contexts in Xi'an, Lanzhou, and Urumqi. The study reveals that proactive personality has a positive impact on job search behavior and that job search self-efficacy mediates this. This finding has important implications for understanding the dynamics of education in the Northwest, particularly leadership and educational innovation. The cross-cultural study revealed that proactive personality also influences entrepreneurial self-efficacy and mindset, which is particularly significant among business students in Xi'an, Lanzhou and Urumqi[17]. The distinctive educational and cultural milieu of these regions significantly impacts research outcomes. In summary, the intersection of proactive personality with entrepreneurial leadership and creativity holds profound implications for Northwest China's educational landscape, offering a fresh perspective on nurturing innovative and entrepreneurial talents[18].

While previous studies have addressed the importance of self-efficacy and entrepreneurial leadership in fostering entrepreneurial intentions, few have focused on how these factors specifically drive creativity,

especially within the unique socio-cultural context of Northwest China. Additionally, there is limited research on how demographic factors, such as gender and age, may influence this relationship, as well as a need for more empirical studies connecting proactive personality traits to creativity in entrepreneurial education settings.

Based on the mediating role of self-efficacy, this study delves into the emerging trends of entrepreneurial leadership in the Northwest Territories educational environment. A conceptual model was designed and optimized for academic settings that emphasizes the dual mediating effects of intrinsic motivation and emotional intelligence between entrepreneurial leadership and creativity[19]. The study reveals how entrepreneurial leadership drives creativity with the help of these mediating variables and integrates the latest research findings between 2019 and 2023, demonstrating regionally unique cultural characteristics and educational trends. This study provides new perspectives and theoretical foundations for deeper understanding and effective promotion of entrepreneurship education.

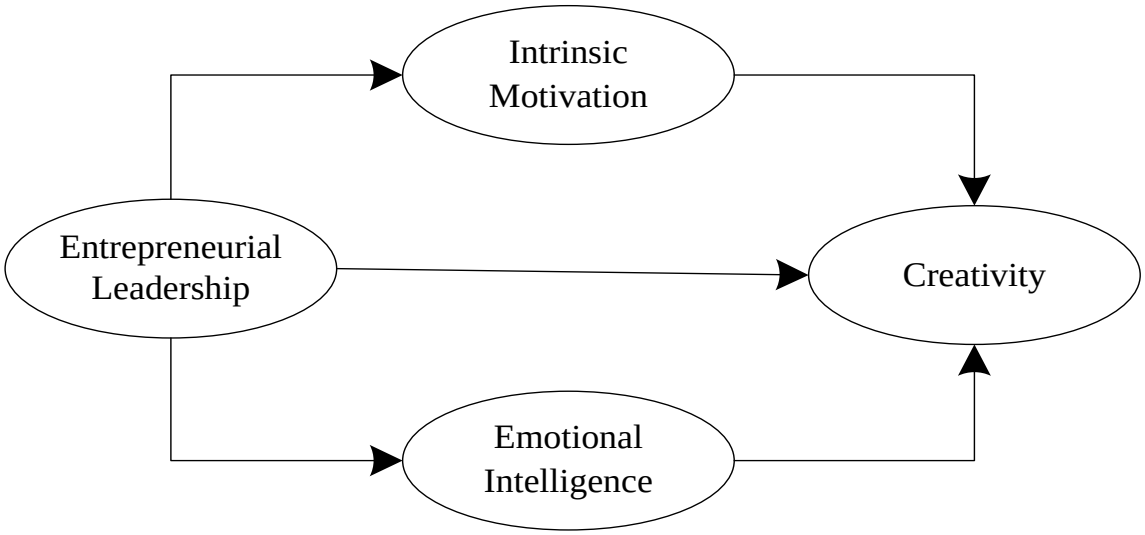

Figure 1. Proposed model structure

Based on the literature review, this study proposes the following research hypotheses:

H1: Entrepreneurial leadership has a positive impact on college students' creativity

This assumption is based on the widely supported view in the literature that entrepreneurial leadership can effectively stimulate creativity among team members by encouraging innovation, risk-taking, and initiative[7] [9].

H2: Intrinsic motivation plays a mediating role between entrepreneurial leadership and creativity

Literature shows that intrinsic motivation is an important driving force for creativity, and it can significantly improve students' creativity through entrepreneurial leadership motivation[3].

H3: Emotional intelligence mediates the relationship between entrepreneurial leadership and creativity

Studies have pointed out that EQ plays a key role in emotion management and interpersonal relationships, and can significantly improve individual creativity[9].

H4: Active personality plays a moderating role between entrepreneurial leadership and creativity

According to the literature, active personality can respond positively to external stimuli, and show stronger creativity and entrepreneurial willingness, especially in an environment with entrepreneurial education background [14] [16].

H5: Gender moderates the effect of entrepreneurial leadership on creativity

Studies have shown that gender may affect individuals' perception of entrepreneurial leadership and their creativity development, so this study hypothesizes that gender plays a moderating role in the relationship between entrepreneurial leadership and creativity[11].

These hypotheses will be tested by quantitative research methods to further explore the complex relationship between entrepreneurial leadership, intrinsic motivation, emotional intelligence, active personality, and creativity.

3. Research methodology

In addressing the research theme "the influence of entrepreneurial leadership on the creativity of college students in Northwest China," the methodology section of this paper rigorously employs a comprehensive quantitative research approach. Its goal is to methodically and scientifically attain the predetermined research objectives. The following is an academic exposition of the core components of this methodological framework:

3.1 Research Design

This study utilized quantitative methods and cross-sectional design to instantly capture the different perspectives on entrepreneurial leadership and creativity among students in management schools in the Northwest Territories. To ensure standardization of data, a structured questionnaire was used as the instrument. For measurement, a five-point Likert scale was used, which allows participants to quantitatively express the level of agreement with the statements in question and has been widely recognized in the field of social science research. The sampling strategy strictly followed the emphasis on sample homogeneity to ensure sample representativeness. At the same time, the study placed high emphasis on ethical considerations, ensuring voluntary participation, confidentiality of responses, and informed consent of all subjects. In the end, 484 valid questionnaires were collected, meeting the high internal validity criteria identified by Calder et al., and Nagar, providing a solid basis for accurately reflecting the characteristics of the sample population.

Xi'an, Lanzhou, and Urumqi were chosen as the primary locations for this research due to their distinct sociocultural environments and notable clusters of academic institutions. Recent literature strongly advocates for this geographical selection strategy, emphasizing its pivotal role in delving deeply into how particular educational and cultural settings influence the intricate dynamics among the variables under investigation, such as entrepreneurial leadership and creativity. Through this regional focus, the study seeks to uncover and clarify the distinctive impacts of these sociocultural contexts on the interplay among the variables studied, offering novel viewpoints and fresh insights for research in these domains.

In conclusion, this approach establishes a robust theoretical basis for investigating the potential influence of perceived entrepreneurial leadership on the creativity, intrinsic motivation, and emotional intelligence of university students in the sample area. Employing rigorous quantitative methodologies, meticulously crafted questionnaire designs, and strategic sample and site selections, this research guarantees precise positioning within the academic landscape, with the goal of generating profound and widely applicable scholarly discoveries.

3.2 Research Measures

This study carefully adjusts and verifies the demographic structure of college students, aiming to accurately capture the unique qualities of entrepreneurial teachers who can promote the development of students' creativity. It is worth mentioning that the scale shows a very high internal consistency, with a Cronbachα coefficient of up to 0.957, ensuring the reliability and accuracy of the measurement results.

Student level of creativity in this study was quantified using a six-factor scale carefully designed by scholars. The Cronbach α value of the scale was as high as 0.919, which fully confirmed the reliability and reliability of the scale in assessing students' creativity. At the same time, in order to deeply explore the intrinsic motivation factors that drive students' creativity, this study adopted the six-item scale proposed by Prabhu et al., which closely fits the actual background of entrepreneurship education in these cities and effectively reflects the key motivation factors that affect students' creativity. The scale showed a good Cronbach reliability (0.918), which further enhanced the robustness of the research conclusions.

The assessment of emotional intelligence, central to this study as a mediating variable, utilized a scale meticulously adjusted by Gupta and Bhawe to accommodate the nuanced cultural distinctions and educational contexts prevalent among students in Northwest China. This scale showed high reliability, with Cronbach alpha reaching 0.909, which ensured the reliability of the measurement results. Moreover, this study also included several population control variables known to have potential effects on entrepreneurial outcomes, and the selection of these variables fits with previous research findings of scholars, further strengthening the rigor of study design.

The sample selected 484 students from three well-known universities in Xi'an, Lanzhou and Urumqi, not only mirrors the distinctive demographic profiles of these educational hubs but also underscores their potential for significant contributions to entrepreneurship.

3.3 Sample and control variables

In a thorough investigation of entrepreneurial behavior, particularly focusing on the intricate mechanism of cultivating creativity within the framework of entrepreneurial leadership, in this study, the core control variables such as gender, age level, marital status, occupational classification and educational background were introduced after careful consideration. This selection stems from previous research highlighting the substantial impact of demographic factors on individual creativity and leadership dynamics. The objective is to effectively control for these variables, enabling a more precise analysis of the fundamental elements and dynamic processes involved in fostering creativity within entrepreneurial contexts.

This sampling approach targets the educational milieu of Northwest China, with particular emphasis on Xi'an, Lanzhou, and Urumqi, encompassing both undergraduate and graduate students in management disciplines, and encompassing pivotal segments of the entrepreneurial community. The sample included 484 students, with a male to female ratio of about 2:1, and their ages were concentrated in the 18-28 age group, reflecting the vitality of the university community. Most of them are unmarried, which is consistent with the characteristics of the student stage. The design ensures the representativeness and research depth of the samples.

4. Assessment and outcome: Measurement analysis of the model

With the help of the latest version of AMOS software, the confirmatory factor analysis and maximum likelihood estimation methods were used to test the rigorous model fitting of the sample data (see Figure 2 and Figure 3 for details). In the evaluation process, we fully considered the potential impact of sample size on the statistics, followed the opinions of Anderson and Gerbing, and carried out a careful analysis of the Chi-square values obtained by CFA. The results showed that the data fit reached an acceptable level. Furthermore, to bolster the reliability of our findings, we systematically evaluated a range of supplementary fit indices,

encompassing Chi-square values and other metrics prescribed by current methodological standards. This approach was pivotal in affirming the accuracy and credibility of our measurement model.

Absolute (χ^2/df, GFI, SRMR, RMSEA), incremental (CFI, TLI, NFI), and reduced (AGFI, PNFI) fit indices were used to evaluate the model fit comprehensively, ensuring a close match with the data and being cost-effective.

Following the standardized procedure established by Hair et al., an incremental fitting index (CFI = 0.959, indicating excellent fit), an absolute fitting index (GFI = 0.901, AGFI = 0.882, and an absolute fitting index (CFI = 0.959, indicating excellent fit) were comprehensively used in this study. Both exceeding the established threshold for good fit) and the chi-square to degrees of freedom ratio (χ^2/d f = 2.395, indicating sufficient fit) were used to rigorously verify the model fit. In addition, RMSEA (= 0.054) and SRMR (= 0.036) were included as additional evaluation indicators, both of which were within the acceptable range, further consolidating the rationality of model fitting. The significance test of PCLOSE value (= 0.111) also strengthened the conclusion of model suitability. The results align closely with the benchmarks outlined by Hu and Bentler (2021), thereby underscoring the robustness and applicability of the measurement model within the particular framework of this investigation.

4.1 Form validity and reliability

It is particularly important to comprehensively assess the structural validity and reliability of the measurement model within the framework of the validated factor analysis in this study, focusing on the two core elements of conceptual validity-convergence and discriminative, through their comprehensive consideration, not only to deepen the understanding of the theoretical framework and the intrinsic connection between specific indicators, but also to lay a solid theoretical foundation and empirical support for the in-depth analysis of the subsequent study. Through their comprehensive consideration, we not only deepen our understanding of the theoretical framework and the intrinsic connection between specific indicators, but also lay a solid theoretical foundation and empirical support for the subsequent research.

4.1.1 Aggregate validity

Average Variance Extraction was used as a key metric for assessing convergent validity, quantifying the proportion of variance captured by the underlying structure relative to the measurement error. Following the state-of-the-art methodological standards, an AVE value above 0.5 indicates adequate convergent validity. Validation factor analysis showed that the AVE values of all key structures significantly exceeded this threshold, demonstrating that the variance of these structures is mainly explained by their corresponding metrics, validating the convergent validity of the measurement model.

4.1.2 Discriminative validity

The assessment of critical validity followed academic rigor and was achieved by means of ensuring inter-conceptual independence by comparing the square root of mean square error extraction with the inter-conceptual correlations. Based on Fornell & Larcker's guidelines, the corrective analysis of this study showed that the correlation matrix was significantly larger for all diagonal elements than for the non-diagonal elements, as shown in Figure 3. This result supports the establishment of discriminant validity, confirming that the amount of variance demonstrated by the concepts through their measures is dominant in comparison to the amount of shared variance.

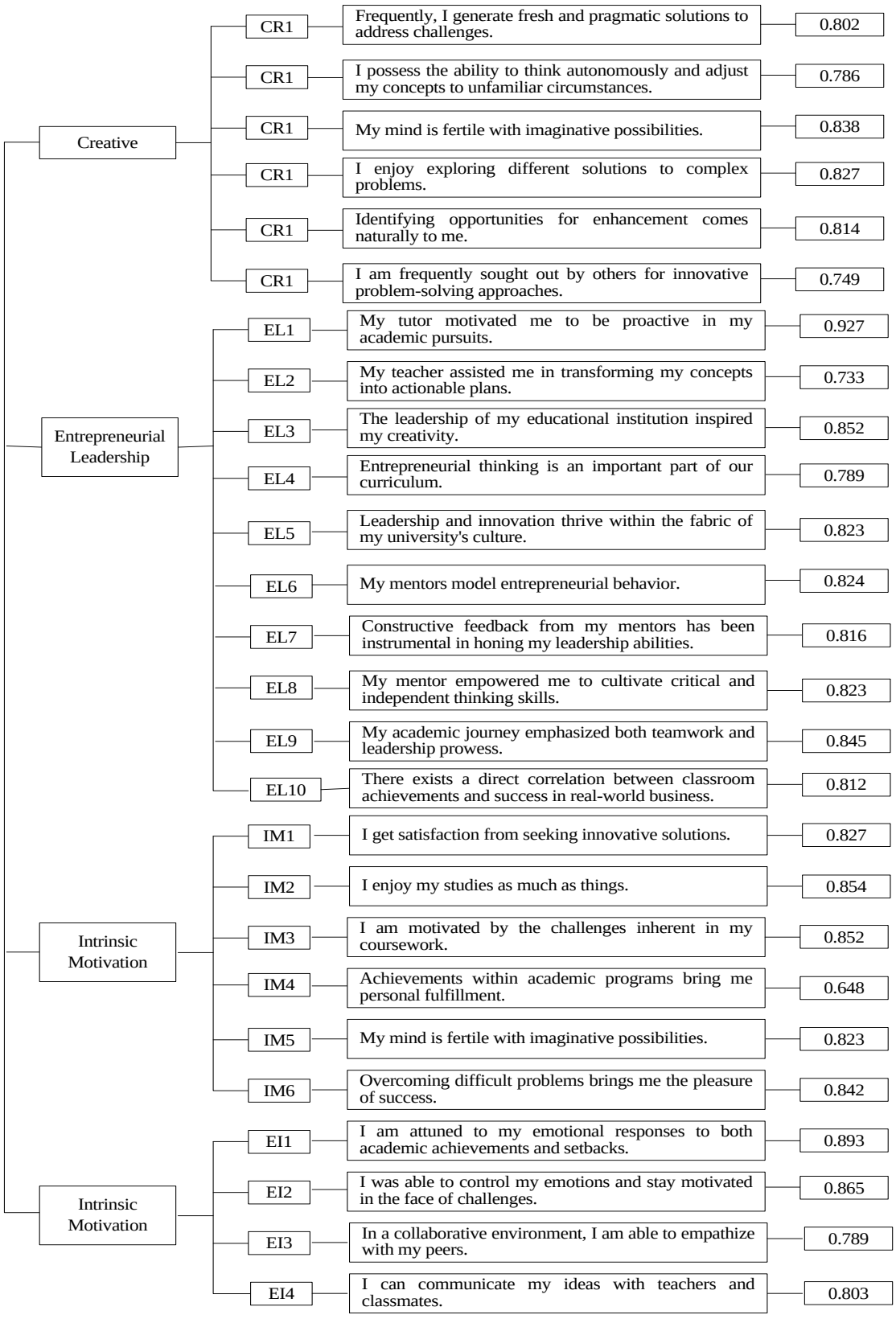

Figure 2. Confirmatory factor Analysis (standardized factor loading)

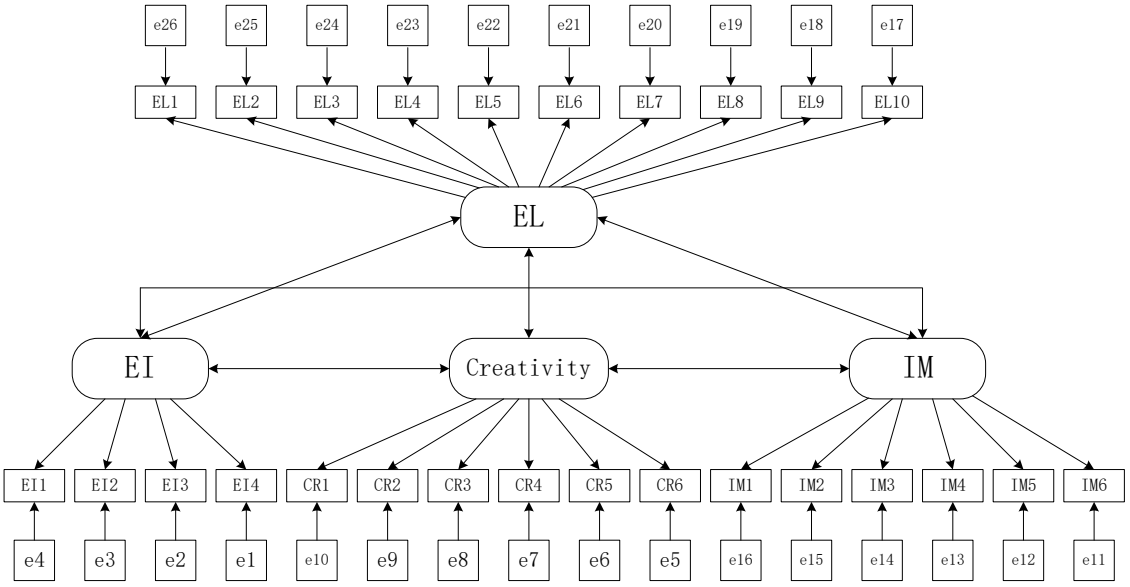

Figure 3. Measurement model

4.1.3 Reliability

In terms of measuring the reliability or internal consistency of a measurement tool, although Kronbach alpha is the traditional evaluation metric, compound reliability (CR) was chosen as the core criterion in this study. In order to provide more detailed and comprehensive reliability assessment. The advantage of CR over Kronbach alpha is that it does not rely on the assumption of equal indicator loads, so it can more accurately reflect the reliability of the measured structure. According to widely recognized benchmarks in the literature, a high degree of reliability of the structure is indicated when the CR value exceeds 0.7. As shown in Table 2, the structures involved in this study all show CR values well above 0.7, which not only validates the reliability of the measurement tools, but also further enhances the robustness of the study conclusions.

An exhaustive and rigorous scrutiny of the reliability and validity of the model of measurement strongly highlights its high level of robustness. This series of analytical steps has an indispensable and critical role in consolidating the study. In particular, the research conclusion -- which is mediated by both intrinsic motivation and emotional intelligence -- is rooted in such a solid and sound empirical foundation, thus ensuring the reliability and universal applicability of the research conclusion.

Table 1 Descriptive statistics, reliability and efficacy

	IM	**EI**	**Creativity**	**EL**
Mean	3.561	3.524	3.825	3.867
SD	1.339	1.012	0.807	0.970
CR	0.813	0.811	0.910	0.946
AVE	0.569	0.718	0.645	0.681
IM	0.718	0.505	0.217	0.217
EI		0.837	0.201	0.369
Creativity			0.801	0.068
EL				0.821

Side note :* Below the diagonal are correlation coefficients, and on the diagonal are the squared average variance extracted (AVE) values.*

IM: internal mood; EI: Emotive quotient; pproactive character; CR: Complex relay; AVE: Average variation of extractions; SD: Std. dev.

4.1.4 Highly methodologically biased

Self-reported data are prone to common methodological biases in research, which pose a potential threat to maintaining the validity of research findings, especially when exploring the complex relationships between core elements. To address this challenge, this study innovatively adopts cutting-edge technology to accurately detect and rationalize potential bias factors that may distort the interpretation of the relationships among these variables, thus ensuring the rigor and reliability of the study findings.

In the preliminary evaluation phase, the Harman Single factor Test, a classic method of bias detection, was used to examine whether all variables converged on a single factor under the framework of exploratory factor analysis. A detailed analysis using the latest version of SPSS software shows that a single potential factor contributes only 33.8% of the total variance to the differential structure, well below the academically accepted critical threshold. This finding strongly demonstrates that the data set collected in this study is not significantly affected by common methodological bias, thus ensuring the independence and reliability of subsequent analytical conclusions.

In order to deepen understanding and overcome the limitations of one-factor testing, this study implemented a validated factor analysis in the AMOS environment, forcing the inclusion of all study constructs into one latent factor. However, the results of the analysis revealed significant model underfitting, as evidenced by multiple fit indices that were well below academically accepted standards of goodness of fit and PCLOSE values that were close to zero. These results provide strong additional evidence against the hypothesis of generalized methodological bias in this study.

In order to ensure methodological rigor, the Common Underlying factor (CLF) technique is introduced as a modern upgrade of Harman's method, based on the recent work of Podsakoff et al., Gaskin. By comparing the path coefficient changes of models with and without CLF, we find that most path changes are minor, and only a few measures of entrepreneurial leadership need to be adjusted. The aim of this measure is to enhance the accuracy and model stability of subsequent analysis.

4.2 Analysis of structural models

After successfully constructing and testing the reliability and validity of the moment concepts, the study proceeded to the next stage by systematically examining the hypothesized relationships within the structural model based on the modified research focus (see Figure 4 for details). Using the latest structural equation modeling techniques and regression analysis, the intricate and interdependent interconnections between the core elemental concepts were explored in detail, thus laying a solid foundation for subsequent theoretical contributions and practical applications.

Table 2 presents a comprehensive and standardized overview of parameter assessments, critical ratios, and P-values, ensuring alignment with current academic standards and recent research trends spanning 2019 to 2023. The present study is highly compatible with the preconceived theoretical framework and clearly found a significant positive association that exists among entrepreneurial leadership and creativity (estimate=0.133, $p<0.05$), which consolidates the theoretical preconception that a high level of intellectual entrepreneurial guidance promotes students to demonstrate greater creativity and confirms the positive effect of entrepreneurship teaching paradigm on creative cognitive development. Meanwhile, the study deepened the understanding of the relationship between intrinsic motivation and creativity, and found that students who recognized their mentors' demonstration of entrepreneurial leadership were more likely to stimulate and sustain high levels of intrinsic motivation, which became an important driver of their creativity growth. In addition, the study reveals that a high level of emotional intelligence, as an important moderator, is closely related to the enhancement of students' creativity, and partially mediates the positive effect of entrepreneurial leadership

on students' creative output, which provides a new direction for a deeper understanding of the complex interaction mechanisms among leadership, psychological traits, and creator.

The results of this study provide solid empirical support for the constructed model, clearly indicating that students' perceptions of entrepreneurial leadership emerged as a key predictor of their creative engagement behaviors in a Northwest Territories city. This finding profoundly reveals that students are more inclined to be motivated to creative endeavors and exploration when they are aware of the entrepreneurial qualities of their educators, an insight that is particularly important in the context of ongoing change in the NWT and provides new perspectives and strategies for understanding and promoting student creativity development.

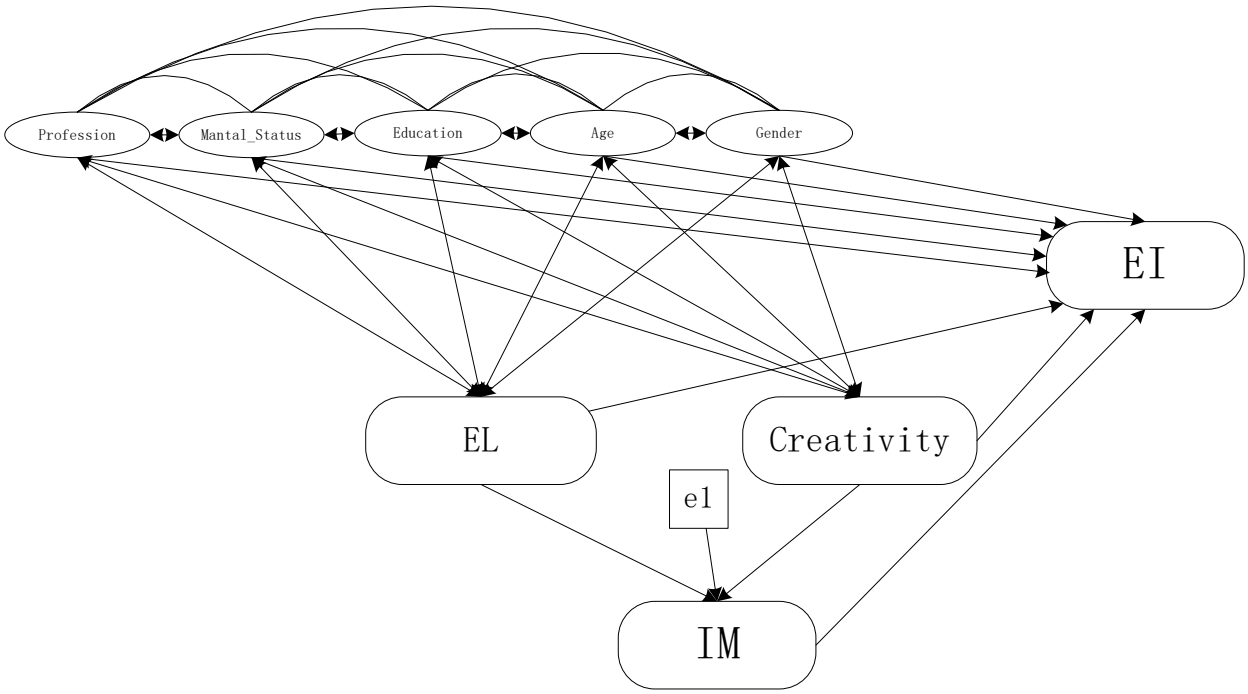

Figure 4. Structural model

4.3 Relationship analysis in structural model

Through structural modeling analysis, this study reveals in depth the complex associations that exist among the core elements. To ensure the comprehensiveness and accuracy of the study, the parameter tests, critical ratios and p-values are listed in Table 3, which have been meticulously prepared and verified to accurately reflect the breadth and depth of the study.

The results of this study strongly support the research model by revealing that creativity significantly benefits from entrepreneurial leadership (estimate=0.332, $p<0.001$), highlighting the central role of leadership in stimulating creativity in academic settings. Meanwhile, the analysis further confirmed the critical role of intrinsic motivation in guiding students to engage in creative activities (Estimate=0.405, $p<0.001$), reflecting the facilitating role of self-efficacy in the development of creative skills, and providing a solid theoretical model and practical framework for a deeper understanding and optimization of creativity fostering strategies in higher education environments in the Northwest.

This study delves into the potential effects of control variables such as gender, age, education, marital status and occupation on student creativity. The findings suggest that entrepreneurial leadership has a significant effect on student creativity transformation in the unique educational ecology of the Northwest Territories and is mediated by both intrinsic motivation and emotional intelligence. This finding provides a

new perspective on the complex interactions between educational leadership and students' personal development, and promotes the expansion and deepening of educational theory.

Table 2 Structural model estimates

	Creativity - entrepreneurial Intelligence	**Entrepreneurial Leadership- EmotionalIntelligence**	**Entrepreneurial Leadership → Creativity Intrinsic Motivation → Creativity**	**Emotional Intelligence → Creativity Gender → Creativity**	**Age → Creativity**	**Education → Creativity**	**Marital Status →> Creativity**	**Profession → Creativity**
Estimate	0.123	0.321	0.449	0.026	-0.013	-0.112	-0.218	0.023
SE	0.046	0.042	0.032	0.065	0.016	0.118	0.257	0.253
CR	2.823	8.012	12.139	0.374	-0.829	-1.032	-0.825	0.131
P-Value	0.002	***	***	0.698	0.329	0.312	0.405	0.902
Standardized Estimates	0.198	0.292	0.458	0.024	-0.032	-0.042	-0.029	0.003

Notes: *Variance explained in entrepreneurial intention (R?)= 37.8%.**p<0.001.*

4.4 Analysis of intermediary effect

This study established the direct and indirect path significance between the variables through a series of regression analyses. The results showed that the significant direct path between perceived entrepreneurial legacy leadership and creativity was accompanied by significant relationships between perceived entrepreneurial legacy leadership and intrinsic motivation and emotional intelligence, as well as the relationship between these mediators and creativity. The inclusion of intrinsic motivation and emotional intelligence during the modeling process resulted in a significant change in the direct effect ($\Delta\beta = 0.105$), indicating that both play a partially mediating role in the transformation of perceived entrepreneurial leadership into creativity. Despite the decrease in the coefficient of the direct effect, its significance remained at a high level ($p<0.001$), validating the robustness and importance of the partial mediation effect. In addition, this study also examined the statistical significance of the indirect effects using the Sobel test, which challenges the null hypothesis that the indirect effects are zero, and utilizes the z-score formula to make precise statistical inferences about the indirect effects. The formula is as follows:

:

$$Z = a \times b / SE_{(ab)}$$

where

$$SE_{(ab)} = \sqrt{a^2 S_b^2 + b^2 S_a^2}$$

This study executed a series of complex statistical tests by calculating the standard errors of the products of the path coefficients and considering the standard errors of the individual path coefficients Sa and Sb. The significant mediating effects of intrinsic motivation and emotional intelligence in the relationship between perceived entrepreneurial leadership and creativity are confirmed and provide a solid empirical foundation for the theoretical model proposed in this paper.

Table 3 Mediating analysis

	Creativity -> IM -> El	**EL →> IM →> EI**
P→D Without M	0.213**	0.366**
P→M	0.213**	0.170**
M→D	0.458**	0.458**
P→D with M	0.108*	0.284**
Φβ	-0.104	-0.084
Sobel Statistics	4.872	3.826
Results	Partial mediation	Partial mediation

Source: *Author.*

Notes: *P: predictor; D: dependent and M: mediator variable.*

***þ < 0.00l; *þ< 0.05.*

Table 3 presents the statistical results of the mediated effects analysis using the modified Sobel test for the sample data of students in the Northwest Territories. The results show that the indirect effects of both mediation models, "creativity influences intrapreneurial leadership through intrinsic motivation" (path coefficient of 4.891) and "entrepreneurial leadership influences emotional intelligence through intrinsic motivation" (path coefficient of 3.925), are significant ($p< 0.05$), supporting the mediating role of intrinsic motivation and emotional intelligence between perceived entrepreneurial leadership and creativity. Although Baron and Kenny's approach constitutes a traditional cornerstone of mediation analysis, it has recently been challenged by the limitations of statistical efficacy and the potential risk of inconsistent mediation phenomena. To ensure the robustness and reliability of the findings, the present study invokes the bootstrap technique as a key means of validating the mediating effect. Table 5 demonstrates the results of the bootstrap analysis, which not only provides strong support for the mediating role of intrinsic motivation and emotional intelligence, but also ensures that the conclusions are nuanced and rigorous.

This detailed analysis not only firmly supports the theoretical basis of our research, but also further emphasizes the indispensability of intrinsic motivation and emotional ability in the cultivation of creativity in the environment of entrepreneurship education by providing empirical evidence consistent with contemporary educational theories, and provides valuable inspiration and guidance for relevant educational practices.

This study utilized Bootstrapping, the core tool of quantitative research, to analyze the model and found a significant substantial indirect effect ($p < 0.05$) between the core factors, a finding that strongly supports the existence of a mediating effect. When the direct effect is equally significant ($p < 0.05$), it indicates the presence of partial mediation. Conversely, if the direct effect is not significant ($p > 0.05$), it may point to a fully mediated situation. In this study, for the mediation model, the indirect effects all reached extremely significant levels ($p < 0.001$), a result that conclusively validates the mediation hypothesis.

The results of the study showed that the indirect effects of path were extremely significant, reaching the level of statistical significance. This suggests that while intrinsic motivation and emotional intelligence play a mediating role, students' perceived entrepreneurial leadership still has a direct positive impact on their creativity, thus strongly supporting the existence of a partial mediation effect. These findings fit with current theoretical advances on how leadership styles form a complex dynamic relationship with student performance in educational settings, further enriching the body of knowledge in the field.

Focusing on the unique socio-cultural and educational environment in Northwest China, this study explores the complex relationship of how the entrepreneurial leadership qualities displayed by educators can significantly promote students' creativity through the dual mediation of intrinsic motivation and emotional intelligence. This investigation broadens the research scope in this domain and offers fresh and deep insights into the dynamics between leadership and creativity development within an educational setting. It enhances our understanding and provides strategies for optimizing these interactions.

Table 4 Mediating analysis

		Creativity -> IM -> El	**EL →> IM →> EI**
Standardized Indirect Effect		0.106**	0.082**
Bootstrap Confidence	Lower	0.049	0.037
	Upper	0.168	0.141
Standardized Direct Effect		0.108*	0.286**
Total Effect		0.217**	0.375**
Results		Partial mediation	Partial mediation

5. Discussion

This study takes college students in major education cities in Northwest China, such as Xi 'an, Lanzhou and Urumqi, as research objects, and probes into the profound influence of entrepreneurial leadership on their creativity development. Through the quantitative analysis of structural equation model (SEM), this study not only reveals the direct impact of entrepreneurial leadership on students' creativity, but also further examines the significant mediating role of intrinsic motivation and emotional intelligence in this process. This analytical framework helps us better understand how entrepreneurial leadership promotes the creativity of college students through multi-dimensional psychological variables in a specific cultural context.

First, this study verifies that entrepreneurial leadership can significantly improve college students' creativity. This finding is consistent with the findings of Jung[7] and Bao Chuanyou et al. [9]. They point out that entrepreneurial leaders can significantly increase team members' ability to innovate through creative motivation, fostering risk-taking, and encouraging new thinking. In particular, entrepreneurial leadership is particularly important in the Northwest region, where cultural diversity and the rapid development of educational resources provide abundant opportunities and challenges for innovation and entrepreneurship.

Secondly, the research further confirms the mediating role of intrinsic motivation between entrepreneurial leadership and students' creativity. This result is consistent with the study of Duan Chaoyan et al.[3]. This study shows that when students perceive that teachers or leaders demonstrate entrepreneurial leadership, their intrinsic motivation can be stimulated and they will be more actively involved in innovative activities. This intrinsic driving force plays a key role in promoting students' creativity, indicating that intrinsic motivation is a factor that cannot be ignored in entrepreneurship education.

At the same time, emotional intelligence, another key variable, also plays a mediating role between entrepreneurial leadership and creativity. The results of this study show that students with high EQ are more able to effectively manage their emotions and deal with complex social relationships, thus providing strong support for the development of creativity. This finding is consistent with the research of Wang Changxiao et al.[9] and Gupta & Bhawe[15]. Their research shows that emotional intelligence not only plays an important role in individual development, but also enhances the atmosphere of team innovation, promotes collaboration and communication, and improves overall creativity.

In addition, this study also found that active personality played a moderating role in the relationship between entrepreneurial leadership and creativity. This finding supports Grant and Zhong Caiwei & Shan Mengmeng that students with an active personality are able to act more positively when faced with entrepreneurial leadership and more effectively translate external motivation into internal creativity [14] [16]. This initiative enables students to better seize entrepreneurial opportunities and show greater potential for innovation.

Finally, gender differences also play an important moderating role in this relationship. This study shows that gender has a significant moderating effect on the influence of entrepreneurial leadership on creativity. This is consistent with the findings of Isiwu & Onwuka, who pointed out that women's entrepreneurial motivation and creativity development are more significantly affected by self-efficacy [11]. This study further reveals that gender factors may affect students' performance in entrepreneurship education, especially differences in self-efficacy and motivation.

Through empirical analysis, this study not only validates the significant promotion effect of entrepreneurial leadership on college students' creativity, but also further reveals the important mediating and moderating role played by intrinsic motivation, emotional intelligence, active personality and gender in this process. This provides important theoretical support and practical enlightenment for the practice of entrepreneurship education in Northwest China and even the whole country.

6. Conclusion

Through the empirical analysis of the impact of entrepreneurial leadership on the creativity of college students in Northwest China, this study reveals the complex relationship between entrepreneurial leadership, intrinsic motivation and emotional intelligence. Research has shown that perceived entrepreneurial leadership significantly promotes the development of students' creativity, and intrinsic motivation and emotional intelligence play an important mediating role in this process. In addition, variables such as positive personality and gender have a moderating effect on the relationship between entrepreneurial leadership and creativity. Through the analysis of structural equation model, the study further verified that entrepreneurial leadership effectively promoted the improvement of creativity by improving students' intrinsic motivation and emotional intelligence.

This study not only provides strong empirical support for the theoretical development of entrepreneurship education in colleges and universities, but also provides practical guidance for optimizing the strategy of entrepreneurship education and improving the innovative ability of college students. Especially in the unique cultural and educational background of Northwest China, the research results provide a new perspective for understanding the impact of entrepreneurial leadership on students' creativity under different cultural backgrounds, and emphasize the importance of paying attention to students' psychological motivation and emotional management ability in entrepreneurship education.

Future educational work should pay more attention to improving students' intrinsic motivation and emotional intelligence, and help them better transform their creativity into practical entrepreneurial actions, so as to promote the cultivation of innovative talents. This not only helps to promote the development of regional economy, but also provides a valuable reference for the country's overall entrepreneurship and innovation environment.

This study is mainly limited to college students in Northwest China, and the sample has regional characteristics, which may not fully represent the entrepreneurial behavior of college students in other regions. In addition, the questionnaire and cross-sectional design used in the study may have limitations in self-reported

bias and causality. Future studies can adopt longitudinal design or multivariate methods, combined with experimental studies or qualitative studies, to further validate and extend the conclusions of this study.

Future studies can further explore the influence of different cultural backgrounds on the relationship between entrepreneurial leadership and creativity, especially in the context of globalization. Cross-cultural comparative studies will provide a broader perspective for understanding this relationship. In addition, the research can be extended to other demographic characteristics, such as students in different disciplines and stages of education, to explore more regulatory factors. In the future, longitudinal studies can also be conducted to analyze the continuous impact of entrepreneurial leadership on students' creativity in different periods, so as to verify the applicability of the conclusions of this study in the long run.

Author contributions

Yuan Gao wrote the paper as a whole, and analyzed the data, Kuan-Chun TSAI reviewed the overall logical framework, and all authors have read and agreed to the published version of the manuscript.

Conflict of interest

The authors declare no conflict of interest.

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