BMC Psychology

RESEARCH

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Teacher-student empathic relationship shaping: an elimination mechanism for psychological segmentations in entrepreneurship education

Kui Yi[1,2†], Xinyu Wang[2†], Yingqi Wu[3†] and Le Zhang[2*]

Abstract

Objective From the perspective of empathy theory, this study focuses on the process of entrepreneurship education to explore the mechanism between teacher-student empathic relationship and psychological connection.

Background Entrepreneurship education aims to provide talent to support the innovative development of society. Previous studies have focused on the educational significance of the promoting entrepreneurial intention, and few have paid attention to the psychological differentiation caused by the incomprehension between teachers and students.

Method By conducting three experiments on cognitive empathy shaping to eliminate confidence segmentation, affective empathy shaping to eliminate confidence segmentation, and the non-negligible affective bias, a total of 424 college undergraduates were invited to participate in this study (405 final valid samples were collected). This study analyzed the impact of cognitive empathy, affective empathy and affective bias on confidence segmentations in entrepreneurship, within the theoretical framework of empathy, as well as the moderating role of objective environmental perception.

Results Cognitive empathy and affective empathy has significant positive effects on the entrepreneurial confidence segmentation between teachers and students, while affective bias plays its role to aggravate the entrepreneurial confidence segmentation. On this basis, objective factors such as individual conditions and supporting environment serve as important moderators, and the significance of rational relationship is higher than that of perceptual relationship.

Conclusions This study indicates that the teacher-student empathic relationship in entrepreneurship education is a dual-process mechanism of connection, and that the rational relationship is more vital than the emotional one. We confirm the psychological significance of teacher-student empathic relationship in entrepreneurship education, and demonstrate the framework of empathy theory in a new context.

Keywords Entrepreneurship education, Teacher-student empathy, Entrepreneurial confidence, Psychological segmentations, Elimination mechanism

†Kui Yi, Xinyu Wang and Yingqi have contributed equally to this work.

*Correspondence:
Le Zhang
18770582650@163.com
Full list of author information is available at the end of the article

Introduction

Entrepreneurship is widely recognized as an important means of driving job growth and sustainable economic development globally, so it has been prioritized and actively advocated by governments. In deepening the research on its engagement, the form of entrepreneurship education has attracted much attention and provoked profound thinking, especially for the practical exploration of university entrepreneurship education programs. Relevant studies have found that entrepreneurship education aims not only to provide students with entrepreneurial skills and preparation [1], but also to develop their entrepreneurial intentions and determination [2]. While it is important to think and act innovatively and habitually, the key prerequisite for entrepreneurship is to inspire a passion for entrepreneurial work and to nurture new pioneers, who are creative and risk-taking.

There is currently a global boom in innovation and entrepreneurship, which means that the importance of innovation and entrepreneurship promotion has been widely recognized. However, the traditional government-led promotion has achieved some success but has tended to saturated. In contrast, entrepreneurship education in colleges and universities, which is student-led, has rapidly improved students' entrepreneurial ability and awareness in a shorter period of time, and provided a swifter approach to the social cultivation of entrepreneurs [3]. As a result, colleges and universities have integrated the entrepreneurship education into their daily teaching content to promote the entrepreneurial culture. Established experiences show that universities have a double advantage in this regard. On the one hand, university students, as emerging entrepreneurial subjects, provide unlimited possibilities for entrepreneurial activities. They can stimulate the innovative potential and vitality of entrepreneurial activities, and become an important force to promote economic development [4, 5]. On the other hand, colleges and universities, as institutions of higher education with high-quality curriculum resources and professional teachers, help students get closer to entrepreneurial examples, quickly cultivate students' entrepreneurial ability and entrepreneurial awareness, and provide them with a stock of knowledge and skills to practically cope with challenges [6, 7]. However, starting a business is a long and uncertain process, which makes entrepreneurial confidence a key factor to drive the process and result of entrepreneurship. According to the theory of planned behavior, there is a high correlation between individuals' entrepreneurial confidence and entrepreneurial motivation and behavior [8, 9]. And only individuals with sufficient confidence can cope with various uncertainties in the process. For example, When the job-seekers have a high awareness of starting a business, and think that they have the ability to execute and complete the entrepreneurial task, their entrepreneurial attitude tend to be more determined [4, 5]. It can be seen that entrepreneurial confidence is a key factor affecting entrepreneurial intentions. Therefore, when the promotion of entrepreneurship education in colleges and universities, needs to focus on how to shape entrepreneurial confidence. And when teachers have confidence, how to shape a psychological transmission between teachers and students, followed by a deeper empathic relationship.

Currently, much of the academic research related to entrepreneurship education in higher education focused on its impact on students' knowledge and skills, entrepreneurial self-efficacy, and creative thinking, as well as the effectiveness of all three in changing entrepreneurial awareness and attitudes. For example, some studies have found that entrepreneurship education can provide knowledge and skills that lead to changes in students' entrepreneurial attitudes and intentions, and further modify students' perceptions of entrepreneurial benefits [10]. It has also been noted that entrepreneurship education changes students' entrepreneurial intentions by increasing entrepreneurial self-efficacy and stimulating students' need for achievement [6, 7]. Additional studies have further revealed the important role of entrepreneurship education in establishing a correct view of career, fostering students' creative thinking, and improving their overall quality [11]. Yet, the above studies only focus on the importance of entrepreneurial outcomes, with little attention paid to the reasons for students' low entrepreneurial intentions, overlooking the significance of the educational process. The importance of the emotional connection between teachers and students in the educational process, to build students' entrepreneurial confidence, has also been neglected, leading to research findings that tend to overlook the entrepreneurial antecedents. Therefore, we focused on the internal causes of students' entrepreneurial intentions, in order to fundamentally clarify its antecedents.

In previous studies, some researchers pointed out that in entrepreneurship education, students can deal with complex challenges in the process of entrepreneurship only if they have mastered sufficient knowledge and skills [12, 13], but scholars such as Lu et al. [14] and Haddoud et al. [15] believed that emotions and feelings are the core driving force for students' actions, and entrepreneurship education is a process of emotion generation, in which emotion plays a crucial role. In order to explore the importance of emotion in entrepreneurship education, this study tested the rational cognition level and the emotional level respectively, and improved the relevant theories of entrepreneurship education. In the field of entrepreneurship education, establishing an emotional

connection between teachers and students is an important foundation for stimulating students' entrepreneurial intentions. And empathy, as a kind of ability to understand other people's feelings and needs, can effectively promote the deep emotional connection between teachers and students, which help to advance students' innovation ability and self-confidence. Therefore, this study integrated the empathy theory into the practical process of entrepreneurship education, aiming to deeply analyze the logic of psychological connection between teachers and students, and to construct a comprehensive model for the impact of empathy on teacher-student relationship in the field of entrepreneurship. The empathy theory proposed by Vachon and Lynam [16], has been subdivided into three main dimensions: cognitive empathy, affective empathy, and affective bias. These three dimensions respectively reflect individuals' understanding of another person's emotional state, empathy for emotional responses, and bias due to emotional differences, which provide a theoretical basis for exploring the complexity of teacher-student relationships. Based on this, this study conducted three experiments corresponding to the above three dimensions. From the perspective of cognitive empathy theory, Experiment 1 aimed to analyze the impact of teacher-student entrepreneurial rational relationship on entrepreneurial confidence segmentations, and to explore how teachers can enhance students' entrepreneurial confidence by understanding their emotions and needs, so as to provide more effective guidance and support. From the perspective of affective empathy theory, Experiment 2 aimed to analyze the impact of teacher-student entrepreneurial perceptual relationship on entrepreneurial confidence segmentations, focusing on how teachers' response to and empathy with students' emotions in classroom communication affects students' emotional experience, which could further affect students' entrepreneurial motivation and self-confidence; From the perspective of affective bias, Experiment 3 aimed to reveal the impact of non-negligible affective bias between teachers and students on entrepreneurial confidence segmentations. This study adopted the experimental method to systematically and empirically analyze the three dimensions of cognitive empathy, affective empathy and affective bias of the empathy theory, to demonstrate their impact on entrepreneurial confidence segregation and their functioning mechanisms. An innovative mechanism has been explored and put forward, for eliminating psychological segregations, which shapes teacher-student empathetic relationship. It provided a concept of teacher-student empathy for entrepreneurship education and further highlighted the significance of the teacher-student psychological relationship. In addition, this study revealed the role of empathy as a psychological connection in education, which not only provided a new way of thinking, for solving the educational challenges caused by students' lack of entrepreneurial confidence, but also provided useful insights for the implementation and development of entrepreneurship education in the future.

The rest of this study is as follows: part 2 explains and defines the relevant theoretical concepts; part 3 presents the theoretical logic of the research topic and proposes the research hypotheses; part 4 identifies the subsequent research methods together with the research topic; parts 5–7 all adopt the experimental method to explore the roles of rational relationship, perceptual relationship, and affective bias on the psychological connection between teachers and students in turn; part 8 integrates the results of the above analyses, summarizing the experimental findings and drawing out the implications and limitations of this study, as well as the direction of future work.

Theoretical foundations and conceptual definition

Confidence segmentations in teacher-student entrepreneurship

According to the social cognitive theory proposed by Bandura [17], it is known that self-efficacy is individuals' self-assessment of their ability to complete certain jobs or tasks, which is a judgement of their own abilities. On this basis, this study regards entrepreneurial confidence as entrepreneurial self-efficacy, which is defined as individuals' cognition, judgment and prediction of their entrepreneurial intentions, entrepreneurial ability and the possibility of entrepreneurial success, and is manifested as the degree of self-confidence in entrepreneurial results. Moreover, individuals with high entrepreneurial self-efficacy tend to be more confident in their entrepreneurial results [18].

However, due to the different cognition between teachers and students in the entrepreneurial process, as well as the objective deviation in the understanding and evaluation of entrepreneurial ability and external environment. This heterogeneity leads to the difference in entrepreneurial efficacy between teachers and students, that is, the differentiation of entrepreneurial confidence between teachers and students.

The connective role of empathy in psychological segmentations

Empathy, is generally regarded as the ability to share and understand the emotions of others [19], which can be divided into three different psychological processes: cognitive empathy, which focuses on recognizing and understanding the perspectives of others; Affective empathy, which focuses on the vicarious emotions caused by other people's emotions; Affective bias,

which focuses on decision-making bias caused by emotional reasoning [20–22].

Empathy is a symbol of closeness, on the contrary, psychological segmentation implies separation, which means that students and teachers cannot establish emotional links, due to their differences in cognition, experience, environment and other aspects, which leads to significant psychological differences for the same things. With the profound application of empathy theory, empathic communication between teachers and students can be combined with the interpersonal interaction law of social psychology [23] to establish emotional connection, enhance mutual understanding and trust, and narrow the psychological distance between teachers and students. It could have a positive impact on students' entrepreneurial psychology and behavior [24], which is also the essence of connecting psychological segmentation of empathy.

Literature Review and Hypotheses

Cognitive empathic connection and confidence segmentations

Cognitive empathy is a psychological ability that refers to individuals' ability to interpret and analyze incoming information, by mobilizing their own cognitive structures, in order to develop a precise understanding of others' experiences and emotions [25]. This ability plays a vital role in facilitating opinion-sharing, as well as enhancing understanding and identification [26]. On the one hand, cognitive empathy can effectively reduce prejudice and misunderstanding between groups, and narrow the confidence segmentation caused by social identity and cultural background [10, 27]; On the other hand, cognitive empathy can enhance communication effectiveness, collaboration efficiency and individuals' self-efficacy in teams, narrowing confidence segmentation within teams [28, 29]; furthermore, cognitive empathy can make individuals perceive more understanding and support in facing challenges, and alleviate the confidence segmentation between people [30, 31]. Based on the above views, this study believes that cognitive empathy is of great significance in eliminating bias, enhancing communication effect, mutual understanding and support between teachers and students, helping to improve students' self-efficacy, and playing a key role in eliminating the confidence segmentation between teachers and students. Based on the above analysis, the following hypothesis is proposed:

> H_1: Cognitive empathy shaping can significantly eliminate the segmentations in teacher-student entrepreneurial confidence.

Affective empathic connection and confidence segmentations

Affective empathy usually refers to being stimulated and affected by others' emotions, which results in one's own emotional evocation [32]. Emotional empathic connection is not only conducive to establishing emotional connection and trust [33, 34], improving the quality of communication and interaction [35], increasing resilience and reducing anxiety in the face of challenges. Eliminating the confidence segmentation caused by environmental stress and social comparison [36, 37]. This study introduces this view into the field of entrepreneurship education, and believes that teachers can achieve deep communication and identification through affective empathy, to alleviate students' fear of entrepreneurial failure, to stimulate their entrepreneurial enthusiasm and motivation, which could eliminate the entrepreneurial confidence segmentation between teachers and students. Based on the above analysis, the following hypothesis is proposed:

> H_2: Affective empathy shaping can significantly eliminate the segmentations in teacher-student entrepreneurial confidence.

Affective bias and confidence segmentations

Affective bias is an inseparable part of empathy, which refers to the tendency of people to use their past experiences, intuition, and instincts to make judgments and decisions about uncertain events, also known as decision-making bias due to perceptual reasoning [38]. Affective bias can significantly affect individuals' cognition and behavior. On the one hand, it confines certain groups to closed social networks and restricts information dissemination [39, 40]; On the other hand, it manifests itself in the emotional distortion on rationally assessing risks and benefits, which leads to biased decision-making results [41]. Moreover, affective bias deepens the differences in expression and interpretation of emotions across cultures [42–44], leading to a confidence segmentation between different groups. This study introduces the above views into the field of entrepreneurship education, proposing that the multidimensional influence of affective bias could change the information flow pattern, decision-making process and social interaction mode between teachers and students. It further increases the differentiation in entrepreneurship confidence between teachers and students to some extent. Based on above analysis, the following hypothesis is proposed in this study:

> H_3: Affective bias can significantly intensify the segmentations in teacher-student entrepreneurial confidence.

Individual condition perception and confidence segmentation

Due to different individual condition such as gender, family status, ability and resources, individuals have different perception of their individual condition [45, 46], which affects their confidence, potential and desire for entrepreneurship [47], thus causing differentiation in the formation and consolidation of emotional connections.

First, cognitive empathy, as the ability to rationally understand others' entrepreneurial intentions and difficulties [48], is highly dependent on the cognitive framework of individuals' own resource endowment. When individuals perceive structural advantages in their own conditions (such as gender and access to resources), their cognitive empathy is more likely to be transformed into a positive bridging effect on the segmentations in teacher-student entrepreneurial confidence [49]. Conversely, the perception of conditioned constraints may amplify the stance bias in cognitive empathy and enhance the teacher-student confidence segmentation [50]. Therefore, individual condition perception affects the dynamic evolution of group confidence boundaries, by reshaping the "weight" of subjects' empathic information interpretation. Based on the above analysis, the following hypothesis is proposed:

> H_{4a}: Individual conditions moderate the elimination path of cognitive empathy and teacher-student entrepreneurial confidence segmentations.

Second, affective empathy emphasizes the immediacy and immersion of emotional resonance [51], and whether it can eliminate confidence segmentation depends on the psychological anchoring effect of individuals on their own conditions. For example, those with superior resources may be "emotional immune" [52] to the condition perception, which weakens their emotional vicariousness of the teacher-student entrepreneurial dilemma and invisibly solidifies the confidence segmentation. Whereas, those with scarce resource may form strong emotional connection and trust due to empathy [53], which reduces individual entrepreneurial anxiety and thus eliminates the teacher-student confidence segmentations. Therefore, although affective empathy has the potential of connection, its effectiveness is limited by the metaphorical interpretation of the subject's own conditions. Based on the above analysis, the following hypothesis is proposed:

> H_{4b}: Individual conditions moderate the elimination path of affective empathy and teacher-student entrepreneurial confidence segmentations.

Last, affective bias is often represented by subjective misjudgment of entrepreneurial risk and return [54], and its association with confidence segmentation should be examined with perceived condition. When individuals perceive the compatibility between their own conditions and entrepreneurial needs, the affective bias may be reconstructed as the "optimism bias" [55], thus weakening the confidence segmentation between groups. If the condition segmentation is perceived, the affective bias can easily degenerate into "defensive pessimism" [56], prompting teachers and students to form opposing narratives on the level of risk cognition. Therefore, perception of condition redefines the generation threshold and action boundary of confidence segmentation, by changing the attribution mode of affective bias. Based on this, the following hypothesis is proposed:

> H_{4c}: Individual conditions moderate the elimination path of affective bias and teacher-student entrepreneurial confidence segmentations.

Supporting environment awareness and confidence segmentation

Different supporting environments, such as schools, families and local government policies, will lead to differences in individuals' perception of their own entrepreneurial supporting environment, which will affect their entrepreneurial intention, motivation and confidence [57, 58], thus causing differences and segmentation between teachers and students, in the formation and consolidation of emotional connection.

First, the supporting environment perception affects the interpretive and coordinating functions of cognitive empathy, significantly moderating its association with the teacher-student entrepreneurial confidence. With the high supporting environment perception, the cognitive empathy of teachers and students towards entrepreneurial policies, resource allocation and risk taking can be systematically integrated, weakening the structural contradictions caused by information asymmetry [59], promoting rational consensus on entrepreneurial opportunities and challenges, and eliminating confidence segmentation caused by cognitive bias [60]. On the contrary, if there is a weak supporting environment perception, the cognitive empathy of teachers and students may fall into the dilemma of "unidirectional interpretation" [61], exacerbating the disagreement on the entrepreneurial feasibility. Therefore, the supporting environment perception indirectly determines the dissolving or strengthening effect of cognitive empathy on confidence segmentation, by shaping the sharing and compatibility of cognitive framework. Based on this, the following hypothesis is proposed:

H_{5a}: Supporting environment moderates the elimination path of cognitive empathy and teacher-student entrepreneurial confidence segmentations.

Second, supporting environmental perception deeply affects the dynamic relationship between affective empathy and entrepreneurial confidence between teachers and students, by reconstructing the functional boundaries of affective empathy. When there are significant differences in supporting environment, affective empathy will be differentiated due to the relative deprivation between groups: the dominant party weakens the depth of empathy due to security [62], while the disadvantaged party strengthens the depth of empathy due to institutional rejection [63]. Therefore, supporting environment can influence the direction of evolution from empathic behavior to confidence synergy or emotional segmentation, by moderating the availability of emotional resources. Based on this, the following hypothesis is proposed in this study:

H_{5b}: Supporting environment moderates the elimination path of affective empathy and teacher-student entrepreneurial confidence segmentations.

Last, the supporting environment perception has a moderating effect on teacher-student entrepreneurship confidence, by intervening in the generation and transformation of affective bias. Highly supportive environment can weaken the cumulative effect of affective bias through institutional feedback mechanism, so that teachers and students can correct their misjudgment of each other's entrepreneurial stance in dynamic interaction, and reduce the confidence segmentation caused by different resource endowment [64]. However, if supporting environment is characterized by fragmentation (such as delayed implementation of policies or disconnection of home-school communication), affective bias may solidify into structural segmentation due to lack of correction channels [65]. This moderation highlights the "re-encoding" function of the environmental system to the affective variables, and its completeness directly determines the intensity and path dependence of affective bias on confidence segmentation. Based on this, the following hypothesis is proposed:

H_{5c}: Supporting environment moderates the elimination path of affective bias and teacher-student entrepreneurial confidence segmentations.

Combining the above hypotheses, we constructed the theoretical model diagram of the path for the impact of empathic relationship shaping on the psychological connection of teachers-students entrepreneurial confidence, as shown in Fig. 1.

Research design

Case studies

This study followed the principle of typicality and universality of the objects, selected a college innovation and entrepreneurship course as the research case, with a total of 424 undergraduates in their junior year have

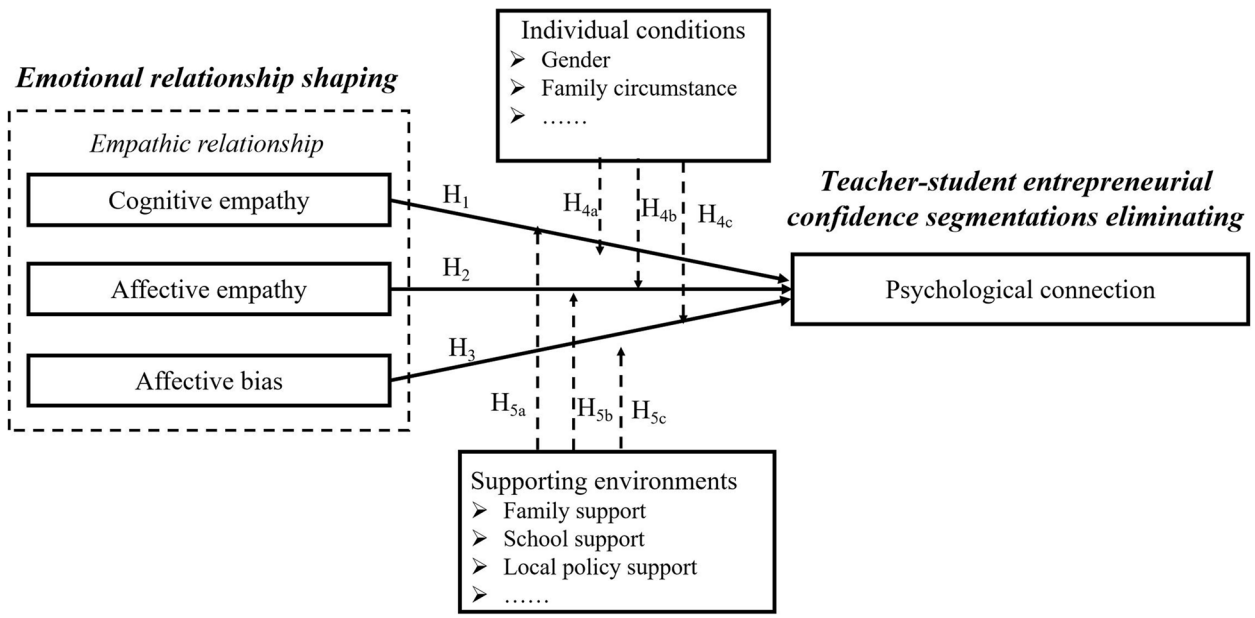

Fig. 1 Theoretical model diagram

been invited to take part in following experiments. Three experiments on rational relationship shaping to eliminate confidence segmentations, emotional relationship shaping to eliminate confidence segmentations, and non-negligible affective bias have been conducted. There were 141 participants in Experiment 1, 148 participants in Experiment 2, and 151 participants in Experiment 3, all experiments were conducted with the knowledge of the experimenters. First, choosing junior undergraduates as the research object, because their employment intention has begun to take shape, with greater entrepreneurial possibilities, and they are in the important formation of entrepreneurial intentions, which can be intervened and guided by timely education. Second, the innovation and entrepreneurship course are of a typical form for entrepreneurship education, through its in-depth exploration, the obtained conclusions have good representativeness and universality, which in turn provide reference for other entrepreneurship education activities. Last, in the experimental process, the research team combined entrepreneurship education with empathy theory, aiming at expanding the understanding of entrepreneurial empathy education in the academia and the educational circle, and bringing a positive impact on the development of innovation and entrepreneurship education. With this innovative research, this study expected to provide new ideas for the current entrepreneurship education.

Research ideas

Based on empathy theory and social psychology theory, this study intended to explore the pathways by which the teacher-student empathic relationship influences psychological connection. In order to understand and explain the logic of "empathy eliminating segmentations" more comprehensively, drawing on Davis et al. [66] and Blanchette and Richards [21], this study conducted three experiments from the perspectives of rational relationship (cognitive empathy), perceptual relationship (affective empathy), and affective bias, together with innovation and entrepreneurship courses in colleges and universities.

Experiment 1 aimed to understand how rational relationships shaping can eliminate the confidence segmentations, which is the relationship between cognitive empathic connection and confidence segmentations. The participants were randomly divided into two groups and the cognitive empathy was taken as the manipulated variable. The same teacher (with high confidence in student entrepreneurship) was invited to give a 45-min innovation and entrepreneurship course to each of the two groups, while cognitive empathy was manipulated for both teachers and students. The teacher was asked to intentionally teach the course in different teaching modes (conventional teaching vs. cognitive empathic teaching) in order to observe the changes of student entrepreneurship confidence in the two groups, so as to compare the teacher-student entrepreneurship confidence segmentations.

Experiment 2 aimed to reveal how perceptual relationships shaping can eliminate confidence segmentations, which is the relationship between affective empathic connection and confidence segmentations. Following the experimental design philosophy of Experiment 1, participants who had not involved were re-organized into random groups, with affective empathy as a manipulated variable. The same teacher (with high confidence in student entrepreneurship) was invited to give a 45-min innovation and entrepreneurship course to each of the two groups, while affective empathy was manipulated for both teachers and students. The teacher was asked to intentionally teach the course in different teaching modes (conventional teaching vs. affective empathic teaching) in order to observe the changes of student entrepreneurship confidence in the two groups, so as to compare the teacher-student entrepreneurship confidence segmentations.

Experiment 3 was designed to verify the impact of affective bias on teacher-student entrepreneurial confidence segmentations. Following the design philosophy of the previous two experiments, participants who had not engaged were randomly grouped, with affective bias as a manipulated variable. The same teacher (with high confidence in student entrepreneurship) was invited to give a 45-min innovation and entrepreneurship course to each of the two groups. The teacher was asked to intentionally manipulate the affective bias (with intervention vs. without intervention) of participants in the experimental group, in order to observe the changes of student entrepreneurship confidence in the two groups, so as to compare the teacher-student entrepreneurship confidence segmentations.

The three experiments above also integrated individual conditions and supporting environment, to explore their moderating role between empathic relationships and psychological connection. The incorporation of individual conditions and supporting environment, helps to comprehensively understand the mechanisms of the three types of empathic relationships and psychological connection, so as to further shed lights on their interactions with confidence segmentations.

Experiment 1: cognitive empathy shaping to eliminate confidence segmentations

Experiment 1 was aimed to examine the influence of teacher-student cognitive empathy on entrepreneurial confidence (test H1), and the moderating mechanism of

individual condition perception and supporting environment perception on cognitive empathy in the process of entrepreneurial education. A one-way between-groups design has been utilized, while involving two groups, a conventional teaching group (control group) and a cognitive empathy teaching group (experimental group).

Experimental design and procedures

College students are an important group in the process of entrepreneurship. The participants in experiment 1 were 141 junior undergraduates from different provinces who participated in the course of innovation and entrepreneurship in the School of Innovation and Entrepreneurship of W University. Meanwhile, in order to avoid potential bias in the sampling process, the researchers first divided the participants into male and female groups based on gender. Then, the two groups were randomly assigned to the two experimental groups, in the form of drawing lots (the number of the two groups was the same, the participants' entrepreneurial intention and the overall characteristics have not significant difference), and each student was numbered, and the number was from small to large.

The same teacher (with high confidence in student entrepreneurship) was invited to teach a 45-min innovation and entrepreneurship course separately, which was whole-process videotaped. And different teaching modes were employed to manipulate teacher-student cognitive empathy. Specifically, in the control group, the teacher adopted a conventional teaching method, which mainly relies on textbook for one-way lecture without involving discussion and interaction among students. The experimental scenario was as follows: The teacher opened the PPT directly in class and began to explain the theoretical knowledge, while the students showed inattentive behaviors, such as playing mobile phones and wandering their minds. However, teachers do not interfere with students' behavior, resulting in a lack of interaction with students and a lack of active atmosphere in the teaching process. Last, the teaching task is completed, and the student leaves the classroom with a blank face.

In the experimental group, teachers use multimedia resources to explain and pay attention to students' learning status, and guide students to discuss and express entrepreneurial ideas. The specific experiment situation is: the teacher puts forward thought-provoking questions, organizes students to have group discussions, stimulates students' thinking and encourages them to speak actively. The teacher asked and guided the students' answers to help them better understand the nature and process of entrepreneurship. Although not all teaching tasks were completed at the end of the class, the students showed a keen interest and were passionate about the topic of entrepreneurship.

Subsequently, at the end of the course participants in both groups were asked to rate the cognitive empathy with the teacher in the class with 5-point Likert scale o on four items, "I can experience joy when the teacher talks about successful cases of entrepreneurship in the class", "I can perceive, understand and identify with the teacher's views and opinions about entrepreneurship in the class", "I can perceive the teacher's views and attitudes about entrepreneurship and how they affect me", and "I get excited when I see a success story" In order to more intuitively measure the emotional connection degree of cognitive empathy between teachers and students in the process of entrepreneurship education, this study adopted a 5-point Likert scale, (1 = very inconsistent, 5 = very consistent) [67], The higher the score, the stronger the cognitive empathy between teacher and student.

After completing the part of the independent variable manipulation, the participants were also required to complete other related questionnaires, which consisted of two parts. The first part was students' personal information, including individual condition (gender, age, family conditions, and self-perception) and supporting environment (family, school, and local policy support). The second part was to measure the entrepreneurial confidence measure, which refers to a scale of Nepal [68], with screening and modification according to the research context, obtaining four question items. In order to intuitively measure students' self-perception of individual condition and supporting environment, both sections were scored on a 5-point Likert scale, categorized as "very low", "low", "medium", "high", "very high". Higher scores indicate that participants were with more entrepreneurial confidence.

At the same time, in order to measure the difference in entrepreneurial confidence between teachers and students, teachers also need to watch the class video after class and fill in the measurement items of entrepreneurial confidence evaluation for each student, according to the student's class performance and opinion expression. The entrepreneurial confidence evaluation is corresponding to students' given number, so as to obtain the teacher's entrepreneurial confidence score. Combined with the score of students' self-entrepreneurship confidence, we calculate the differentiation of teachers' and students' entrepreneurial confidence, that is, the absolute value of the difference between teachers' and students' self-entrepreneurship confidence scores. Through this indicator, we can better understand the segmentation in teacher-student entrepreneurial confidence.

Experimental results and analyses

Manipulation check and reliability test

11 invalid questionnaires were excluded and 130 valid questionnaires were collected, with an effective rate of 92.199%. The average age of the participants was 20.491 years ($SD = 0.912$) and 71.538% were female. In addition, Cronbach's α coefficient of the cognitive empathy scale was 0.964, and that of the entrepreneurial confidence scale was 0.962, both of which were greater than 0.7, indicating good internal consistency and reliability of the scale. To further test the effectiveness of manipulation on cognitive empathy in Experiment 1, one-way analysis of variance (ANOVA) was used in this study. As shown in Fig. 2, the cognitive empathy scores of the experimental group were significantly higher than those of the control group (experimental group M = 4.305, SD = 0.369, control group M = 1.915, SD = 0.743). It suggests that our manipulation on cognitive empathy between teachers and students in the classroom is effective.

Hypothesis test

First, we examine the influence mechanism of cognitive empathy on the entrepreneurial confidence segmentation between teachers and students. Based on the results of one-way ANOVA in Fig. 2, it was found that there was a significant difference in entrepreneurial confidence between the experimental group and the control group ($P < 0.001$). Compared with the traditional teaching control group, the entrepreneurial confidence segmentation between teachers and students in the cognitive empathy teaching group was smaller (M = 0.195, SD = 0.265; M control group = 2.428, SD = 0.766), the students' entrepreneurial confidence was higher, so cognitive empathy can shape rational relationship to eliminate the confidence segmentation between teachers and students, which validated H_1.

Second, we verified the moderating role of individual condition perception in the relationship between cognitive empathy and students' entrepreneurial confidence, which mainly focused on students' family circumstances (living standard, income). Process model 1 was employed (Bootstrap sample: 5000) with 95% confidence intervals. The analysis results are shown in Table 1. The results show that cognitive empathy, individual condition perception, and the interaction effect of cognitive empathy and individual condition perception have significantly positive effects on students' entrepreneurial confidence, with regression coefficients of 0.465, 0.556, and 0.099, respectively. This further validates that cognitive empathy can shape rational relationship, significantly improve students' entrepreneurial confidence, and eliminate the teacher-student confidence segmentation. Moreover, it can be preliminarily verified that individual condition perception can positively moderate the relationship between cognitive empathy and students' entrepreneurial confidence.

In order to further explore the difference of one factor dependent on another at different levels, this study

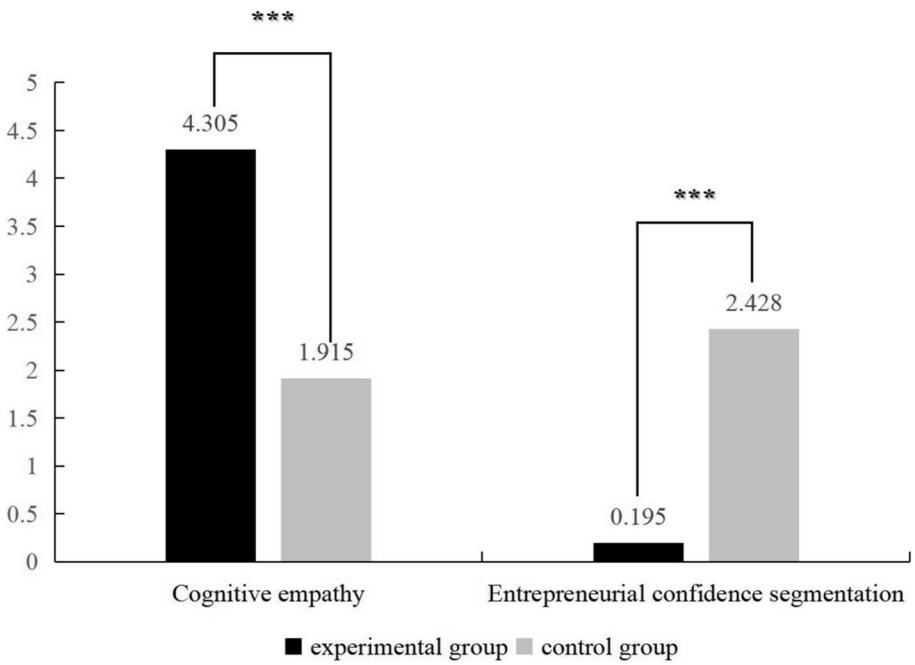

Fig. 2 Experiment 1—One-way ANOVA

Table 1 Moderating effect test of individual condition perception on the relationship between cognitive empathy and entrepreneurial confidence

Path	*β*	*SE*	*P*	*95%CI*	
				LLCI	*ULCI*
Cognitive Empathy → Students' Entrepreneurial Confidence	0.465	0.038	0.000	0.389	0.539
Individual Condition Perception → Students' Entrepreneurial Confidence	0.556	0.041	0.000	0.476	0.636
Cognitive Empathy*Individual Condition Perception → Students' Entrepreneurial Confidence	0.099	0.024	0.000	0.052	0.147

continues to conduct simple effect analysis, and the specific results were shown in Table 2. On the one hand, with fixed individual condition perception, it was found that when cognitive empathy was at different levels, the impact of individual condition perception on students' entrepreneurial confidence scores ($p<0.05$) had its statistical significance, and when there is a high cognitive empathy, individual condition perception had the greatest impact on students' entrepreneurial confidence ($F=95.101$). On the other hand, with fixed cognitive empathy, it was found that only when individual condition perception was medium or high, the impact of cognitive empathy on students' entrepreneurial confidence scores ($p<0.01$) had its statistical significance, and with high individual condition perception, cognitive empathy had the greatest impact on students' entrepreneurial confidence ($F=11.126$). In summary, the effect of cognitive empathy on entrepreneurial confidence is more pronounced for individuals with higher individual condition perception, which means higher individual condition perception will strengthen the positive predictive effect of cognitive empathy on teacher-student entrepreneurial confidence segmentation, and H_{4a} was validated.

Last, we verified the moderating role of the supporting environment perception in the relationship between cognitive empathy and students' entrepreneurial confidence, including local policies, school policies, and family support. Using the above test methods, the analysis results are shown in Table 3. The results showed that cognitive empathy, supporting environment perception, and the interaction effect of cognitive empathy and supporting environment perception had significantly positive effects on students' entrepreneurial confidence, with regression coefficients of 0.647, 0.389, and 0.084, respectively, which once again verified that cognitive empathy can shape rational relationship, significantly improve students' entrepreneurial confidence, and eliminate the teacher-student confidence segmentation. Moreover, it can be preliminarily verified that the supporting condition perception can positively moderate the relationship between cognitive empathy and students' entrepreneurial confidence.

In order to further explore the difference of one factor dependent on another at different levels, this study continues to conduct a simple effect analysis, as shown in Table 4. On the one hand, with fixed supporting environment perception, it was found that when cognitive empathy was at different levels, the impact of supporting environment perception on students' entrepreneurial confidence scores ($p<0.01$) had its statistical significance, and when cognitive empathy was high, supporting environment perception had the greatest impact on students'

Table 2 Simple effects analysis of the interaction between individual condition perception and cognitive empathy

Variable Effect	*df*	*MS*	*F*	*p*
Individual Condition Perception WITHIN Cognitive Empathy Very Low	2	0.980	16.590	0.000
Individual Condition Perception WITHIN Cognitive Empathy Low	2	0.877	14.850	0.000
Individual Condition Perception WITHIN Cognitive Empathy Medium	2	1.225	20.743	0.000
Individual Condition Perception WITHIN Cognitive Empathy High	4	5.618	95.101	0.000
Individual Condition Perception WITHIN Cognitive Empathy Very High	1	0.253	4.280	0.041
Cognitive Empathy WITHIN Individual Condition Perception Very Low	3	0.031	0.533	0.661
Cognitive Empathy WITHIN Individual Condition Perception Low	2	0.000	0.000	1.000
Cognitive Empathy WITHIN Individual Condition Perception Medium	3	0.278	4.706	0.004
Cognitive Empathy WITHIN Individual Condition Perception High	2	0.657	11.126	0.000
Cognitive Empathy WITHIN Individual Condition Perception Very High	1	0.001	0.009	0.923

Table 3 Moderating effect test of supporting environment perception on the relationship between cognitive empathy and entrepreneurial confidence

Path	*β*	*SE*	*P*	*95%CI*	
				LLCI	*ULCI*
Cognitive Empathy → Students' Entrepreneurial Confidence	0.647	0.037	0.000	0.573	0.721
Supporting Environment Perception → Students' Entrepreneurial Confidence	0.389	0.042	0.000	0.306	0.473
Cognitive Empathy*Supporting Environment Perception → Students' Entrepreneurial Confidence	0.084	0.027	0.002	0.030	0.138

Table 4 Simple effects analysis of the interaction between supporting environment perception and cognitive empathy

Variable Effect	*df*	*MS*	*F*	*p*
Supporting Environment Perception WITHIN Cognitive Empathy Very Low	2	0.798	7.284	0.001
Supporting Environment Perception WITHIN Cognitive Empathy Low	3	0.512	4.677	0.004
Supporting Environment Perception WITHIN Cognitive Empathy Medium	2	0.780	7.122	0.001
Supporting Environment Perception WITHIN Cognitive Empathy High	4	4.297	39.229	0.000
Supporting Environment Perception WITHIN Cognitive Empathy Very High	2	0.739	6.745	0.002
Cognitive Empathy WITHIN Supporting Environment Perception Very Low	3	0.031	0.287	0.834
Cognitive Empathy WITHIN Supporting Environment Perception Low	2	0.761	6.945	0.001
Cognitive Empathy WITHIN Supporting Environment Perception Medium	4	8.468	77.309	0.000
Cognitive Empathy WITHIN Supporting Environment Perception High	3	3.929	35.867	0.000
Cognitive Empathy WITHIN Supporting Environment Perception Very High	1	0.340	3.106	0.081

entrepreneurial confidence ($F=39.229$). On the other hand, with fixed cognitive empathy, it was found that only when the supporting environment perception was low, medium or high, the impact of cognitive empathy on students' entrepreneurial confidence score ($p<0.01$) had its statistical significance, and when the supporting environment perception was low, the cognitive empathy had the least impact on students' entrepreneurial confidence ($F=6.945$).To summarize, the impact of cognitive empathy on entrepreneurial confidence is more pronounced for individuals with high supporting environment perception. The moderating effect of the supporting environment perception is significant, which means the supporting environment perception significantly reinforces the positive relationship between cognitive empathy and teacher-student entrepreneurial confidence segmentations, which validated H_{5a}.

Results and discussion

Experiment 1 verified the impact of cognitive empathy on eliminating the teacher-student entrepreneurial confidence segmentations. The results showed that the entrepreneurial confidence segmentation between teachers and students in the cognitive empathy teaching group was smaller (M group = 0.195, SD = 0.265; M control group = 2.428, SD = 0.766). Through more abundant teaching forms in entrepreneurial education methods, students' enthusiasm can evoke their cognitive empathy, and then eliminate the confidence segmentation between teachers and students. It suggested that the establishment of a rational relationship between teachers and students through cognitive empathy is based on entrepreneurial cognition, which can eliminate the teacher-student entrepreneurial confidence segmentations, as well as promote the teaching efficiency.

In addition, this study also found that individual conditions as well as supporting environment play a moderating role in the impact of cognitive empathy on eliminating teacher-student entrepreneurial confidence segmentations, and it goes for individuals with high cognitive empathy or low cognitive empathy. When cognitive empathy was high, the impact of supporting environment perception on students' entrepreneurial confidence was the greatest ($F=39.229$), and when the supporting environment perception was low, the impact of cognitive empathy on students' entrepreneurial confidence was the least ($F=6.945$). This reveals that students with a high perception of their own condition and supporting environment are more likely to trust the opinions conveyed by teachers, in the process of entrepreneurship education. In the teaching process, teachers can improve students' cognitive empathy ability and cultivate rational

relationship between teachers and students by changing teaching methods.

However, considering the small number of experimental participants, only 141 students from W university were selected for the experiment, which affected the universality of experimental results. In addition, the process of cognitive empathy is often accompanied by affective empathy, because they are inseparable. After analyzing the teacher-student rational relationship and psychological connection relationship shaping, it is worth considering whether the emotional relationship between teachers and students will have an impact on psychological connection. Therefore, in order to further investigate whether affective empathy accompanied by cognitive empathy, has an impact on teacher-student entrepreneurial confidence segmentations, we carried out Experiment 2 following the research design of Experiment 1.

Experiment 2: affective empathy shaping to eliminate confidence segmentations

Experiment 2 was aimed to examine the impact of affective empathy on the entrepreneurial confidence segmentation between teachers and students (Test H2), and to clarify the moderating effects of individual condition perception and supporting environment perception on affective empathy in the process of entrepreneurial education. A one-way between-groups design was employed, with a conventional teaching group (control group) and an affective empathy teaching group (experimental group).

Experimental design and procedures

According to the screening conditions of experiment 1, the participants of experiment 2 were also 148 junior undergraduates from the School of Innovation and Entrepreneurship of W University. In addition, in order to ensure the independence of the experiment, the participants did not engage in other experiments before. According to the classification scheme of experiment 1, experiment 2 also randomly allocated male and female groups to one of the two experimental groups (the number of the two groups is the same, and there is no significant difference in their entrepreneurial intention and overall characteristics), and numbered each student in an order from small to large.

Following the idea of Experiment 1. The same teacher (with high confidence in students' entrepreneurship) gave a 45-min innovation and entrepreneurship course to the two groups of participants, which was whole-process videotaped. The affective empathy between teacher and students was again manipulated by different teaching modes. Specifically, in the teaching experiment of the control group, the teacher taught according to the traditional teaching form in experiment 1, and directly explained according to the textbook content, without involving discussion or other interactive links between students.

In the teaching experiment of the experimental group, teachers are committed to creating a positive emotional atmosphere and introducing entrepreneurial stories to students in an emotionally rich way, aiming to stimulate students' enthusiasm for entrepreneurship. The specific experiment situation is: the teacher walks into the classroom with a smile, plays a video of the entrepreneurial story of a well-known entrepreneur, and introduces these cases passionately, thereby introducing the theme of the class. In class, the teacher pays attention to subtle changes in students' expressions and ask leading questions to stimulate students' thinking and express personal ideas. The teacher makes rational analysis based on students' answers to help them better understand the essence of entrepreneurship and their advantages in entrepreneurship. Through their positive attitude, the teacher successfully motivated the students, making the whole group of students present in mutual interaction and active atmosphere, and the students' expressions changed from worried to confident. Despite not being able to complete all the tasks, the students showed great enthusiasm and anticipation for the topic of entrepreneurship. In the whole process of teaching experiment, teachers' emotional guidance and students' participation and interaction jointly cultivated students' positive attitude and deep thinking.

Subsequently, after complete the course, the two groups of participants were asked to rate their affective empathy with the teacher on four items, which are referred to the affective empathy part of the Basic Empathy Scale ("I can be aware of the teacher's emotions before he explicitly states his emotions", "When the teacher is happy about a successful business case, I feel more confident about the entrepreneurship", "I feel the teacher's emotions and attitudes towards entrepreneurship", and "When I see a successful entrepreneurship in a video, I feel happy about it, too"), In order to more intuitively measure the emotional connection of affective empathy between teachers and students in the process of entrepreneurship education, this study adopted a 5-point Likert scale (1 = very inconsistent, 5 = very consistent) [67], that is, the higher the score, the stronger the affective empathy between teachers and students. In addition, both teachers and participants were required to complete the entrepreneurial confidence evaluation, as well as measuring of entrepreneurial confidence segmentation between teachers and students. The measurement method was the same as experiment 1.

Experimental results and analysis

Manipulation check and reliability test

Excluding the 13 under-filled questionnaires, 135 valid questionnaires were collected. The participants' average age was 20.532 years old ($SD = 0.904$), and 66.667% were female. In addition, the Cronbach's α coefficient of the affective empathy scale was 0.973, greater than 0.7, indicating good internal consistency and reliability of the scale. To further test the effectiveness of manipulation in experiment 2 on affective empathy, one-way analysis of variance (ANOVA) was used in this experiment. As shown in Fig. 3, the affective empathy score of the control group (M group = 1.649, SD = 0.382) was significantly lower than that of the experimental group (M group = 4.313, SD = 0.397). It shows that affective empathy manipulation is effective.

Hypothesis test

First, we examine the effect of affective empathy on the entrepreneurial confidence segmentation between teachers and students. According to the results of one-way ANOVA as shown in Fig. 3, there was a significant difference in entrepreneurial confidence between the experimental group and the control group ($P < 0.001$). Compared with the traditional teaching control group, the entrepreneurial confidence segmentation between the teachers and students in the affective empathy teaching group was smaller (M control group = 2.474, SD = 0.813, M experimental group = 0.246, M experimental group = 2.474, SD = 0.813, and M experimental group = 0.246, respectively). SD = 0.373), students' entrepreneurial confidence score is higher, so affective empathy can shape emotional relationship to eliminate the confidence segmentation between teachers and students, which validated H_2.

Second, we verified the moderating role of individual condition perception in the relationship between affective empathy and students' entrepreneurial confidence. Individual condition perception in this study mainly considered students' family circumstances (standard of living and income). Process model 1 was employed (Bootstrap sample: 5000) with 95% confidence intervals. The analysis results are shown in Table 5. The results showed that the main effect of affective empathy was significantly positive, while the main effect of individual condition perception was not significant, and the interaction effect between affective empathy and individual condition perception was significantly negative, with regression coefficients of 0.919, −0.039, and −0.062, respectively, which further verified that affective empathy can shape perceptual relationship and significantly improve students' entrepreneurial confidence. In addition, it can be preliminarily verified that individual condition perception negatively moderates the relationship between affective empathy and students' entrepreneurial confidence.

In order to further explore the difference of one factor dependent on another at different levels, this study continued to conduct a simple effect analysis, as shown

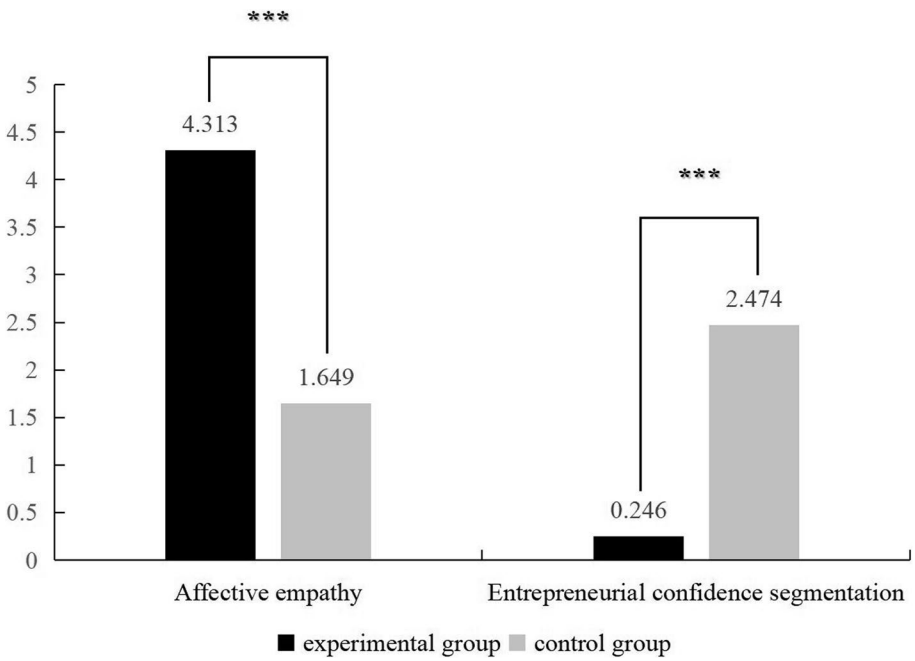

Fig. 3 Experiment 2—One-way ANOVA

Table 5 Moderating effect test of individual condition perception on the relationship between affective empathy and entrepreneurial confidence

Path	*β*	*SE*	*P*	*95%CI*	
				LLCI	*ULCI*
Affective Bias → Students' Entrepreneurial Confidence	0.919	0.023	0.000	0.874	0.963
Individual Condition Perception → Students' Entrepreneurial Confidence	−0.039	0.034	0.252	−0.107	0.028
Affective Bias*Individual Condition Perception → Students' Entrepreneurial Confidence	−0.062	0.022	0.005	−0.105	−0.019

in Table 6. On the one hand, with fixed individual condition perception, it was found that only when affective empathy was very low, medium or very high, the impact of individual condition perception on students' entrepreneurial confidence scores ($p<0.05$) had its statistical significance. When affective empathy is very high, individual condition perception has the least influence on students' entrepreneurial confidence ($F=3.232$). When affective empathy was medium, individual condition perception had the greatest impact on students' entrepreneurial confidence ($F=8.366$). On the other hand, with fixed the affective empathy, it is found that except the individual condition perception was very low, in other cases, the impact of affective empathy on the students' entrepreneurial confidence score ($p<0.01$) had its statistical significance. And affective empathy has the least effect on students' entrepreneurial confidence when individual condition perception is very high ($F=22.394$); affective empathy has the greatest effect on students' entrepreneurial confidence when individual condition perception is medium ($F=230.640$). In summary, the positive effect of affective empathy on entrepreneurial confidence is more effective for individuals with poor individual condition perception, while the positive effect of affective empathy on entrepreneurial confidence is more insignificant for individuals with better perception, which means individual condition perception will weaken the positive predictive effect of affective empathy on the teacher-student entrepreneurial confidence segmentations, and H_{4b} was validated.

Last, we verified the moderating role of supporting environment perception (local policies, school policies, and family support) in the relationship between affective empathy and students' entrepreneurial confidence. Using the above test methods, the analysis results are shown in Table 7. The results showed that the main effect of affective empathy was significantly positive, while the main effect of supporting environmental perception was not significant, and the interaction effect of affective empathy and supporting environmental perception was significantly negative, with regression coefficients of 3.638, 0.086 and −0.243, respectively, which once again verified that affective empathy can shape perceptual relationship and significantly improve students' entrepreneurial confidence. Moreover, it can be preliminarily verified that the supporting environment perception negatively moderates the relationship between affective empathy and students' entrepreneurial confidence.

In order to further explore the difference of one factor dependent on another at different levels, this study continues to conduct a simple effect analysis, as shown in Table 8. On the one hand, with fixed supporting

Table 6 Simple effects analysis of the interaction between individual condition perception and affective empathy

Variable Effect	*df*	*MS*	*F*	*p*
Individual Condition Perception WITHIN Affective Empathy Very Low	3	0.409	3.879	0.011
Individual Condition Perception WITHIN Affective Empathy Low	4	0.097	0.922	0.454
Individual Condition Perception WITHIN Affective Empathy Medium	2	0.881	8.366	0.000
Individual Condition Perception WITHIN Affective Empathy High	3	0.091	0.865	0.461
Individual Condition Perception WITHIN Affective Empathy Very High	2	0.340	3.232	0.043
Affective Empathy WITHIN Individual Condition Perception Very Low	1	0.040	0.381	0.538
Affective Empathy WITHIN Individual Condition Perception Low	3	2.548	24.187	0.000
Affective Empathy WITHIN Individual Condition Perception Medium	4	24.294	230.640	0.000
Affective Empathy WITHIN Individual Condition Perception High	4	14.478	137.448	0.000
Affective Empathy WITHIN Individual Condition Perception Very High	2	2.359	22.394	0.000

Table 7 Moderating effect test of supporting environment perception on the relationship between affective empathy and entrepreneurial confidence

Path	*β*	*SE*	*P*	*95%CI*	
				LLCI	*ULCI*
Affective Empathy → Students' Entrepreneurial Confidence	3.638	0.083	0.000	3.474	3.802
Supporting Environment Perception → Students' Entrepreneurial Confidence	0.086	0.113	0.449	−0.137	0.309
Affective Empathy*Supporting Environment Perception → Students' Entrepreneurial Confidence	−0.243	0.078	0.002	−0.398	−0.089

Table 8 Simple effects analysis of the interaction between supporting environment perception and affective empathy

Variable Effect	*df*	*MS*	*F*	*p*
Supporting Environment Perception WITHIN Affective Empathy Very Low	4	0.229	1.848	0.124
Supporting Environment Perception WITHIN Affective Empathy Low	3	0.051	0.414	0.743
Supporting Environment Perception WITHIN Affective Empathy Medium	1	0.200	1.610	0.207
Supporting Environment Perception WITHIN Affective Empathy High	4	0.093	0.752	0.558
Supporting Environment Perception WITHIN Affective Empathy Very High	3	0.207	1.665	0.178
Affective Empathy WITHIN Supporting Environment Perception Very Low	2	9.158	73.739	0.000
Affective Empathy WITHIN Supporting Environment Perception Low	3	15.510	124.879	0.000
Affective Empathy WITHIN Supporting Environment Perception Medium	4	21.824	175.720	0.000
Affective Empathy WITHIN Supporting Environment Perception High	4	10.498	84.522	0.000
Affective Empathy WITHIN Supporting Environment Perception Very High	2	3.185	25.647	0.000

environment perception, it was found that the supporting environment perception had no statistical significance on students' entrepreneurial confidence scores at any levels of affective empathy ($p > 0.05$). On the other hand, with fixed affective empathy, it was found that the impact of affective empathy on students' entrepreneurial confidence score ($p < 0.001$) had its statistical significance, when the supporting environment perception was at different levels. And when the supporting environment perception was medium, affective empathy had the greatest impact on students' entrepreneurial confidence ($F = 175.720$). When the supporting environment perception was very high, affective empathy had the least effect on students' entrepreneurial confidence ($F = 25.647$). In summary, for individuals with better supporting environment perceptions, the positive effect of affective empathy on students' entrepreneurial confidence is weakened, while for individuals with poor supporting environment perceptions, affective empathy is more effective in positively influencing students' entrepreneurial confidence, which means there is a significant moderating effect of the supporting environment, weakening the positive effect of affective empathy on the teacher-student entrepreneurial confidence segmentations, and H_{5b} was validated.

Results and discussion

Experiment 2 verified the impact of affective empathy on the teacher-student entrepreneurial confidence segmentations. The results showed that the entrepreneurial confidence between teachers and students in the affective empathy teaching group was smaller (M control group = 2.474, SD = 0.813, M experimental group = 0.246, SD = 0.373). This shows that teachers can fully mobilize students' vitality and arouse students' emotional resonance, by presenting entrepreneurial examples and creating a positive emotional atmosphere, thus eliminating the confidence segmentation between teachers and students.

Furthermore, for individuals with high or low affective empathy, individual conditions as well as supporting environment played a moderating role in eliminating teacher-student entrepreneurial confidence segmentations by affective empathy. In this experiment, when the supporting environment perception was medium, affective empathy had the greatest impact on students' entrepreneurial confidence ($F = 175.720$). When the supporting environment perception was very high, affective empathy had the least effect on students' entrepreneurial confidence ($F = 25.647$). However, the entrepreneurial confidence segmentation of the two groups of students with higher perception of their own conditions

and supporting environment was weakened by affective empathy. This finding differed from cognitive empathy research. After carefully analyzing the experimental results, this study suggested that individuals who perceive their surroundings and conditions well, will have higher confidence in the possibilities and conditions of their entrepreneurship, so they will believe in and hold on to their own judgements. Such individuals are less likely to be affected by emotions from others, their entrepreneurial confidence more likely to be influenced by their own judgement, so teacher's affective empathy could not have a significant impact on them. It shows that in the process of entrepreneurship education, teachers can carry out targeted teaching for different types of students, and for students with poor perception of their own condition and supporting environment, they can evoke students' affective empathy through motivating teaching, to eliminate the confidence segmentation between teachers and students.

However, in addition to cognitive empathy and affective empathy, there is also affective bias in the emotional connection between teachers and students, and its impact on teacher-student entrepreneurial confidence should not be overlooked. At the same time, considering that the first two experiments only used students in W university as experimental objects, the universality of experimental results may be affected. Therefore, in order to more systematically explore the relationship between teacher-student emotional connection and entrepreneurial confidence segmentations, Experiment 3 was conducted based on the affective bias between teachers and students.

Experiment 3: non-negligible affective bias

Experiment 3 verify the impact of affective bias on the teacher-student entrepreneurial confidence segmentations (H_3), At the same time, we explore the moderating mechanism of individual condition perception and supporting environment perception on affective bias in the process of entrepreneurship education. a one-way between-groups design was again employed, engaging a control group (affective bias without intervention) and an experimental group (affective bias with intervention). And each student was numbered and seated in order of number from smallest to largest.

Experimental design and procedures

In order to avoid potential bias in sample uniformity, 151 junior undergraduates from H university were selected as experimental participants for experiment 3. Meanwhile, to ensure the independence of the experiment, all participants had not engaged in other experiments before. According to the classification scheme of experiment 1, they were randomly assigned to two experimental groups in the form of male and female groups (the size of the two groups was the same, and there is no significant difference in their entrepreneurial intention and overall characteristics), and each student was numbered and seated in order from small to large.

Following the idea of Experiment 1. The same teacher (with high confidence in students' entrepreneurship) gave a 45-min innovation and entrepreneurship course to the two groups of participants, which was whole-process videotaped. The affective bias of participants in the experimental group was intervened, while the teaching modes in two groups are the same. Specifically, in the teaching experiment of the control group, teachers adopted the teaching form of empathy, combined with successful entrepreneurial cases, used pictures, videos and other forms to convey entrepreneurial information and organize discussions to students in a positive and vivid tone, and guided students to feel the enthusiasm and vitality of entrepreneurship. The specific experiment situation is: At the beginning of the class, the teacher walks into the classroom with a smile on his face, plays the photos and videos of well-known entrepreneurs' entrepreneurship stories and introduces them passionately, introducing the class theme of the day. In class, the teacher pay attention to students' micro-expressions, raise discussion questions, guide students to think in relation to their own situations, and encourage them to actively express their ideas. Among them, a small number of students show irrational cognition and bias, due to previous entrepreneurial failure and stereotypes. The teacher did not pay special attention to the entrepreneurial bias of a small number of students, resulting in these students still holding worries about the prospect of entrepreneurship at the end of the class.

In the teaching experiment of the experimental group, on the basis of the empathic teaching form, the teacher pay special attention to the students' views and cognition on entrepreneurship, and correct the wrong cognition in time from the students' concerns. Teachers happily explain successful entrepreneurial cases and interesting entrepreneurial experiences to help students correct wrong images and intuitions to eliminate their affective bias on entrepreneurship. The detailed experimental scenario was as follows: after posing the question, the teacher focused on addressing the answers with some students' irrational perceptions, pointed out their emotional problems, and guided them to abandon their prejudices, in order to correctly and objectively understand entrepreneurship. It not only helped some students to change their attitudes, but also give them great motivations. While the teacher's positive feelings and attitudes successfully affected the students. The

attitude of this group of students changed significantly from apprehensive to confident.

After the course, the participants were all asked to fill out a self-rated questionnaire on affective bias. Referred to the Adult Decision Making Competence (ADMC) scale designed by Bruine de Bruin et al. [69], and combined with the contextualized statements of this study, we conducted the Affective Bias (Decision-making Bias) Scale, which contained four items ("There are a lot of entrepreneurial failures around me, so I still won't try to start a business", "I have experience the failure of family business, which makes me afraid to set an entrepreneurship", "I think the market environment is not clear enough, so I choose not to start an entrepreneurship", and "I think my entrepreneurship will eventually face a failure, so I choose not to start my own business"), In order to more intuitively measure the impact of affective bias on the entrepreneurial confidence segmentation between teachers and students in the process of entrepreneurial education, this experiment adopted a 5-point Likert scale, (1 = very inconsistent, 5 = very consistent) [67]. The higher the score, the more students are affected by affective bias. In addition, teachers and students were equally required to complete the Entrepreneurial Confidence Scale, to measure the teacher-student entrepreneurial confidence segmentations, in the same manner as in Experiment 1.

Experimental results and analysis

Manipulation check and reliability test

11 miss-filled questionnaires were excluded, and collected 140 valid questionnaires. The average age of the participants was 20.562 years old ($SD = 0.954$), and 68.571% were female. In addition, the Cronbach's α coefficient of the self-evaluated affective bias scale was 0.955, greater than 0.7, indicating good internal consistency and reliability level. To further test the effectiveness of manipulation in experiment 3 on affective bias, one-way analysis of variance (ANOVA) was used. As shown in Fig. 4, the affective bias score of the experimental group (experimental group M = 1.803, SD = 0.517) was significantly lower than that of the control group (control group M = 4.192, SD = 0.518). It shows that the manipulation on affective bias is effective.

Hypotheses test

First, we examine the influence of affective bias on entrepreneurial confidence between teachers and students. Based on the results of one-way ANOVA in Fig. 4, the entrepreneurial confidence segmentation showed significant difference between the two experimental groups ($P < 0.001$). Compared with the traditional teaching control group, the entrepreneurial confidence segmentation between teachers and students in the teaching experimental group after the intervention of affective bias was smaller (M experimental group = 0.173, SD = 0.292; M

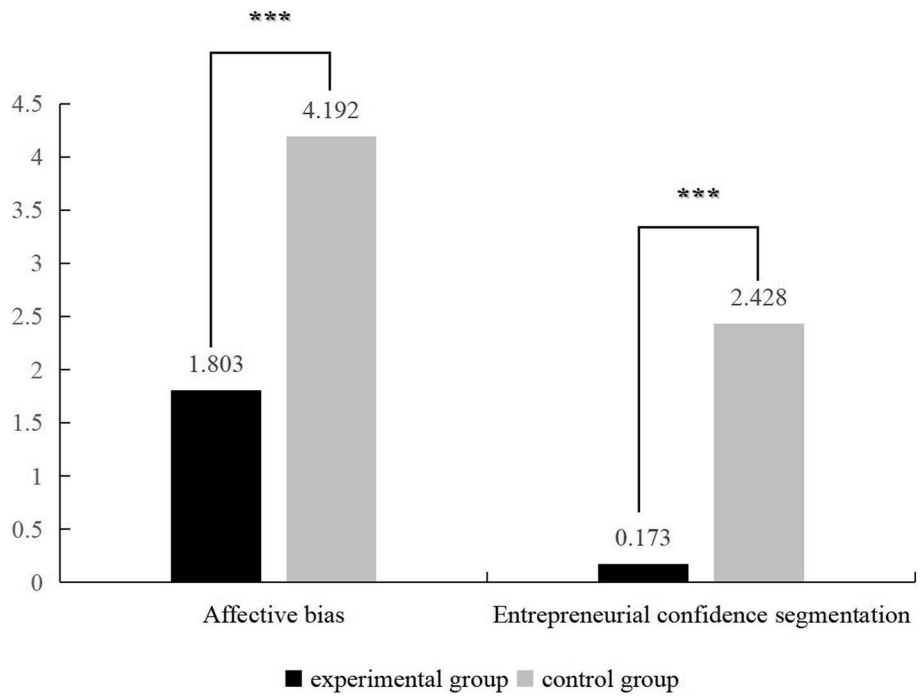

Fig. 4 Experiment 3—One-way ANOVA

control group = 2.428, SD = 0.779), students' entrepreneurial confidence score was higher, so reducing affective bias could eliminate the confidence segmentation between teachers and students, and H3 was verified.

Second, we verified the moderating role of individual condition perception in the relationship between affective bias and students' entrepreneurial confidence, which in this study focused on students' family circumstances (living standard and income). Process model 1 was employed (Bootstrap sample: 5000) with 95% confidence intervals. The analysis results are shown in Table 9. The results show that the main effect of affective bias is significantly negative, the main effect of individual condition perception is significantly positive, and the interaction effect between affective bias and individual condition perception is significantly negative, with regression coefficients of −0.459, 0.502, and −0.069, respectively. This further validates that reducing affective bias can significantly improve students' entrepreneurial confidence and eliminate the teacher–student confidence segmentation. Moreover, it can be preliminarily verified that individual condition perception can negatively moderate the relationship between affective bias and students' entrepreneurial confidence.

In order to further explore the difference of one factor dependent on another at different levels, this study continues to conduct a simple effect analysis, as shown in Table 10. On the one hand, with fixed individual condition perception, it is found that the impact of individual condition perception on the students' entrepreneurial confidence scores ($p < 0.05$) has its statistical significance, when the affective bias is at different levels. When the affective bias is very high, the individual condition perception has the least influence on students' entrepreneurial confidence ($F = 6.401$). When affective bias is low, individual condition perception has the greatest impact on students' entrepreneurial confidence ($F = 117.431$). On the other hand, with fixed affective bias, it was found that only when individual condition perception was medium, high or very high, the impact of affective bias on students' entrepreneurial confidence scores ($p < 0.01$) had its statistical significance. And when individual condition perception is very high, affective bias has the least effect on students' entrepreneurial confidence ($F = 11.377$). In summary, for individuals with better individual condition perception, the negative effect of affective bias on their entrepreneurial confidence is weakened, which means the moderating effect of individual condition perception is significant, weakening the negative predictive effect of affective bias on entrepreneurial confidence, and H_{4c} was validated.

Table 9 Moderating effect test of individual condition perception on the relationship between affective bias and entrepreneurial confidence

Path	*β*	*SE*	*P*	*95%CI*	
				LLCI	*ULCI*
Affective Bias → Students' Entrepreneurial Confidence	−0.459	0.037	0.000	−0.532	−0.386
Individual Condition Perception → Students' Entrepreneurial Confidence	0.502	0.035	0.000	0.432	0.572
Affective Bias*Individual Condition Perception → Students' Entrepreneurial Confidence	−0.069	0.023	0.003	−0.114	−0.025

Table 10 Simple effects analysis of the interaction between individual condition perception and affective bias

Variable Effect	*df*	*MS*	*F*	*p*
Individual Condition Perception WITHIN Affective Bias Very Low	1	0.580	11.509	0.001
Individual Condition Perception WITHIN Affective Bias Low	2	5.913	117.431	0.000
Individual Condition Perception WITHIN Affective Bias Medium	3	1.808	35.914	0.000
Individual Condition Perception WITHIN Affective Bias High	3	1.719	34.137	0.000
Individual Condition Perception WITHIN Affective Bias Very High	1	0.322	6.401	0.013
Affective Bias WITHIN Individual Condition Perception Very Low	1	0.181	3.591	0.060
Affective Bias WITHIN Individual Condition Perception Low	3	0.036	0.707	0.549
Affective Bias WITHIN Individual Condition Perception Medium	1	0.609	12.090	0.001
Affective Bias WITHIN Individual Condition Perception High	2	0.694	13.784	0.000
Affective Bias WITHIN Individual Condition Perception Very High	3	0.573	11.377	0.000

Last, we verified the moderating role of supporting environment perception in the relationship between affective bias and students' entrepreneurial confidence, including local policies, school policies, and family support. With the method mentioned above, the analysis results are shown in Table 11. The results show that the main effect of affective bias is significantly negative, the main effect of supporting environment perception is significantly positive, and the interaction effect between affective bias and supporting environment perception is significantly negative, with regression coefficients of −0.465, 0.467, and −0.068, respectively. It is once again verified that reducing affective bias can significantly improve students' entrepreneurial confidence and eliminate the confidence segmentation between teachers and students. Moreover, it can be preliminarily verified that supporting environment perception negatively moderates the relationship between affective bias and students' entrepreneurial confidence.

In order to further explore the difference of one factor dependent on another at different levels, this study continues to conduct a simple effect analysis, as shown in Table 12. On the one hand, with fixed supporting environment perception, it is found that the impact of supporting environment perception on the students' entrepreneurial confidence scores ($p < 0.05$) has its statistical significance, when the affective bias is at different levels. When the affective bias is very high, the supporting environment perception has the least influence on students' entrepreneurial confidence ($F = 5.402$). When affective bias is low, the supporting environment perception has the greatest impact on students' entrepreneurial confidence ($F = 73.433$). On the other hand, with fixed affective bias, it was found that only when the supporting environment perception was medium, high or very high, the impact of affective bias on students' entrepreneurial confidence scores ($p < 0.01$) had its statistical significance. And when the supporting environment perception was medium, the affective bias had the greatest impact on students' entrepreneurial confidence ($F = 29.440$). When the supporting environment perception is high, the affective bias has the least impact on students' entrepreneurial confidence ($F = 7.464$). In summary, the negative effect of affective bias on entrepreneurial confidence is weakened for individuals with a better supporting environment perception, while the negative effect of affective bias on entrepreneurial confidence is strengthened for individuals with a worse supporting environment perception. It revealed that there is a significant moderating effect of the supporting environment, which

Table 11 Moderating effect test of supporting environment perception on the relationship between affective bias and entrepreneurial confidence

Path	*β*	*SE*	*P*	*95%CI*	
				LLCI	*ULCI*
Affective Bias → Students' Entrepreneurial Confidence	−0.465	0.045	0.000	−0.554	−0.375
Supporting Environment Perception → Students' Entrepreneurial Confidence	0.467	0.042	0.000	0.385	0.549
Affective Bias*Supporting Environment Perception → Students' Entrepreneurial Confidence	−0.068	0.025	0.007	−0.118	−0.019

Table 12 Simple effects analysis of the interaction between supporting environment perception and affective bias

Variable Effect	*df*	*MS*	*F*	*p*
Supporting Environment Perception WITHIN Affective Bias Very Low	1	0.784	9.877	0.002
Supporting Environment Perception WITHIN Affective Bias Low	2	5.826	73.433	0.000
Supporting Environment Perception WITHIN Affective Bias Medium	3	0.975	12.290	0.000
Supporting Environment Perception WITHIN Affective Bias High	2	1.909	24.061	0.000
Supporting Environment Perception WITHIN Affective Bias Very High	1	0.429	5.402	0.022
Affective Bias WITHIN Supporting Environment Perception Very Low	1	0.179	2.260	0.135
Affective Bias WITHIN Supporting Environment Perception Low	3	0.001	0.013	0.998
Affective Bias WITHIN Supporting Environment Perception Medium	1	2.336	29.440	0.000
Affective Bias WITHIN Supporting Environment Perception High	2	0.592	7.464	0.001
Affective Bias WITHIN Supporting Environment Perception Very High	2	0.773	9.745	0.000

weakens the negative predictive effect of affective bias on entrepreneurial confidence, and H_{5c} was validated.

Results and discussion

Experiment 3 examined the influence of affective bias on entrepreneurial confidence segmentation between teachers and students. The results showed that the entrepreneurial confidence segmentation between teachers and students in the teaching experimental group after affective bias intervention was smaller (M experimental group = 0.173, SD = 0.292; M control group = 2.428, SD = 0.779), which indicates that entrepreneurial intention and decision-making of middle school students after entrepreneurial education are inevitably affected by affective bias, and intervention can eliminate the entrepreneurial confidence segmentation between teachers and students, and the educational effect is more obvious.

In addition, this study confirmed that individual conditions as well as supporting environment play a moderating role in the relationship between affective bias and entrepreneurial confidence segmentations, no matter how much the individuals are affected by affective bias. When the affective bias was very high, individual condition perception and supporting environment perception had the least influence on students' entrepreneurial confidence ($F = 6.401$) and ($F = 5.402$), respectively. It may be due to the fact that students with lower perceptions of the supporting environment on entrepreneurship and individual conditions, are often influenced by their own experiences of failure or inherent perceptions. Therefore, they are more afraid to make an attempt, which increases the fear of failure, thus reinforcing the negative impact of affective bias on entrepreneurial confidence. Therefore, in the process of entrepreneurship education, teachers can help such students improve their cognitive ability by imparting entrepreneurial knowledge and emotional guidance, so as to reduce the impact of affective bias on entrepreneurial confidence segmentation. In the process of the experiment, because the research variables of the experiment depend on personal psychological feelings, the participants often need to evaluate according to their own subjective judgment when filling in the questionnaire, which may lead to bias in the measurement of the research variables.

Research conclusions

Conclusions

With the vigorous implementation of innovation and entrepreneurship education worldwide, how entrepreneurship education affects entrepreneurial confidence and its specific influence mechanism have become important issues that needs to be explored. Based on the perspective of empathy theory, this study focuses on the process of empathy in entrepreneurship education, establishes the path connection between empathy relationship and psychological connection, and explores the effectiveness of emotion in the process of entrepreneurship education from the perspective of cognitive rationality and emotional sensibility. We explored the influence mechanism between cognitive empathy, affective empathy, and affective bias to teacher-student entrepreneurial confidence segmentations through three experiments respectively. The experimental results reflected the following aspects. First, cognitive empathy and affective empathy have significant positive effects on entrepreneurial confidence between teachers and students. This close partnership helps to bridge the gap between teachers and students to build confidence, and improve the effectiveness and quality of entrepreneurship education. Second, affective bias will intensify the entrepreneurial confidence segmentation between teachers and students. In entrepreneurship education, teachers and students may have affective biases due to poor communication, misunderstanding and other reasons, which may lead to conflicts between teachers and students, thus affecting their cooperation and interaction. Thirdly, individual condition perception and supporting environment perception play an important moderating role in affecting empathic segmentation on teacher-student entrepreneurial confidence. For students, self-perceived individual condition and supporting environment are the cornerstone of their entrepreneurial confidence.

Theoretical implications

First, based on the empathy theory, this study raised the issue of teacher-student psychological segmentations regard to entrepreneurship education. Previous studies related to entrepreneurship education have mostly focused on the vital impact of entrepreneurship education, how it changes students' entrepreneurial attitudes, and enhances their entrepreneurial intention. It has been pointed out that entrepreneurship education can change students' entrepreneurial attitudes and increase their entrepreneurial intentions, by improving the skills and knowledge they need to start a business, as well as preparing them to carry out entrepreneurial activities[7, 11]. However, few researchers have noticed the fitness of empathy theory with entrepreneurship education, and entrepreneurial confidence could lead to low entrepreneurial intentions. Therefore, this study focused on the teacher-student entrepreneurial confidence segmentations, and solved the challenges of low entrepreneurial confidence, from the perspective of empathy theory. This study argued that by incorporating empathic teaching in the entrepreneurship education, the emotional relationship between teachers and students can be

shaped to eliminate psychological segmentations. In the future, researchers should explore more teaching methods of empathic teaching and the influence of different empathic teaching models on the emotional connection between teachers and students.

Second, this study proposed the connective role of empathy, combining it with social psychology theory to further expand research on teacher-student empathic relationships. Currently, academics have realized the important role of empathy in teacher-student relationships. Some researchers have found that empathic education courses help teachers and students to exchange views and interact emotionally, achieving psychological resonance and emotional resonance, which could promote a harmonious teacher-student relationship based on classroom knowledge[70]. But few researchers have clarified the psychological change in shaping teacher-student relationships, and its impact on teacher-student psychological segmentations. Therefore, this study aimed to explore the path of empathic relationship and teacher-student psychological segmentations. The study showed that the shaping of empathic relationship between teachers and students, helps to eliminate the teacher-student entrepreneurial confidence segmentations. It revealed the positive impact of cognitive empathy and affective empathy on the psychological connection, as well as the negative impact of affective bias. Meanwhile, this study also examined the moderating role of external factors such as individual conditions and supporting environments. By studying how entrepreneurship education shapes the emotional connection and establishes the psychological connection between teachers and students, we have a deeper understanding of the relationship shaping between teachers and students, which provides theoretical guidance for the future research on the relationship between teachers and students in entrepreneurship education, and enriches the research on the emotional aspect of entrepreneurship education. In addition to empathy, the emotional relationship between teachers and students is also enriched. Future research should focus on exploring the role of different emotional factors in the psychological connection between teachers and students, so as to provide more theoretical guidance for the shaping of teacher-student relationship.

Third, this study proposed the concept of teacher-student empathy, which is a mechanism for people to communicate deeply with each other. And we demonstrated the function of affective bias, which contrasted with the existing literature in the field of empathy. Existing studies usually focused on cognitive empathy and affective empathy, and research on teacher-student empathic relationship focuses on how to engage students' cognition and emotions in the classroom [71, 72]. Although previous studies have recognized the importance of cognitive and affective empathy between teachers and students, inadequate studies on affective bias have been conducted to explore the mechanism of empathic relationships on psychological segmentations. Therefore, this study took affective bias into account, and showed that the negative impact of affective bias cannot be ignored, as people are often unable to make decisions and judgements that fully fit the ideal effect with limited information. Therefore, it is important to consider how to maximize the engagement of cognition and emotions in empathic teaching, while also to pay attention to reducing the hindrance of affective bias on empathy. This study explored the mechanism of affective bias as part of the empathic relationship, revealing the negative impact of affective bias on the teacher-student psychological connection. However, in the process of teacher-student psychological connection, there are more than one influencing factor of emotional bias, future studies can explore the effects of other influencing factors on teacher-student psychological connection.

Managerial implications

Combined with the current higher education, there are the following insights for the future of entrepreneurship education to eliminate the teacher-student entrepreneurial confidence segmentations, from the perspective of empathy.

First, entrepreneurship educators should focus on establishing rational relationships to shape students' entrepreneurial thinking, based on cognitive empathy. Teachers should pay attention to guide students' thoughts in the entrepreneurship education, and encourage they to actively express their cognition, opinions and ideas about entrepreneurship. At the same time, diversified teaching is an important means to enhance the teaching efficiency. Such as group discussions, can guide students for better listening, speaking and talking, which changes the rigid mode for "one person alone has the say" of teachers, to exercise the initiative of students. Through exchanging views, teachers can to respond to students' opinions in time, and give practical advice to enhance students' entrepreneurial thinking, and realize mutual understanding between teachers and students. It lessens the affective bias towards entrepreneurship, so as to eliminate the entrepreneurial confidence segmentations.

Second, entrepreneurship educators need to strengthen students' affective empathy, connecting the perceptual relationship shaped by affective empathy to confidence segmentations. When carrying out course for entrepreneurship education, teachers need to abandon the fixed teaching mode that centered on themselves, pay more attention to the emotions of students, fully mobilize the

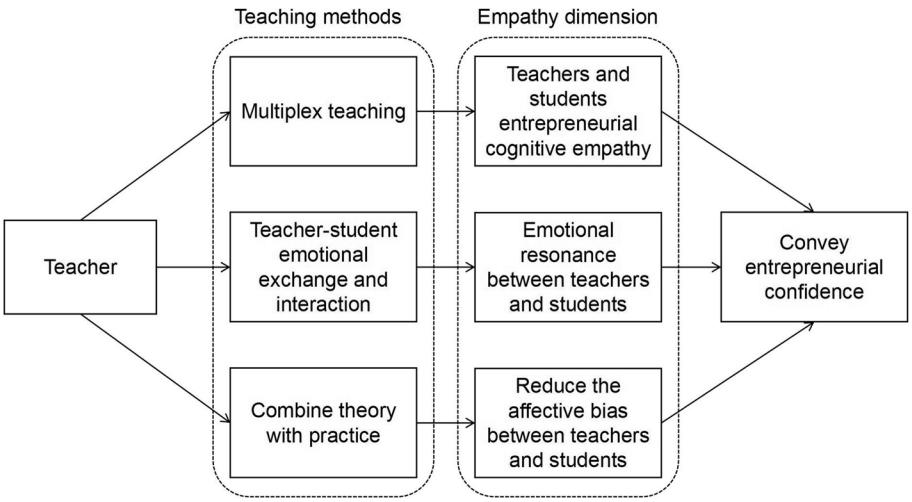

Fig. 5 Roadmap for the empathy-driven approach to entrepreneurship education

emotional factors, thus increase the emotional communication and interaction in the classroom. For example, when explaining the knowledge of entrepreneurship, with case stories and other content, teachers should be full of enthusiasm to stimulate students' emotional response and resonance. It can motivate the psychological resonance of students, stimulate their enthusiasm for entrepreneurship, achieve emotional communication with teachers, and establish a perceptual relationship, thus eliminating the teacher-student entrepreneurial segmentations.

Third, entrepreneurship educators should reduce the impact of affective biases on students' entrepreneurial confidence. Teachers can combine theoretical knowledge with real life, and replace entrepreneurial stories with more practical cases, so as to enhance students' identity with course. It will not only prevent students from taking these stories as unrealistic fantasies, but also increase their entrepreneurial confidence and the possibility to achieve their goals. In addition, teachers can also encourage students' participation out of the classroom, by organizing various entrepreneurial practical activities, such as entrepreneurship competitions and sand table exercise. It can encourage students combine the theoretical knowledge learning with practice in a timely manner, which can effectively prevent mistakes in decisions making.

Fourth, entrepreneurship educators should focus on students' individual conditions and supporting environments. It can be seen that the impact of empathetic relationship shaping on the elimination of teacher-student psychological segmentations could be comprehensively enhanced by personalized supportive plans, regular communication and feedback mechanisms, expanded practice opportunities, positive campus climate, as well as psychological support and consultation.

To sum up, this study form a route for implementing empathy-driven approach in entrepreneurship education (as shown in Fig. 5).

Limitations and future research

From the perspective of empathy, this study focused on eliminating teacher-student entrepreneurial confidence segmentations, conducted experimental research around the empathic process of entrepreneurship education, so as to reveal the impact of various aspects of empathy on the teacher-student entrepreneurial confidence segmentations. We carried out meaningful exploration to enhance the efficiency of entrepreneurship education. However, there are still some limitations in this study.

First, measurements of the study variables may be limited. Since the research variables of the experiment depend on individual psychological feelings, participants often need to evaluate according to their own subjective judgment when filling out questionnaires, which may lead to potential bias and other problems. Future studies can adopt more objective measurement methods to reduce research errors.

Second, the research object can be further expanded. The experimental participants of this study are some college students from two universities, and the experimental samples are relatively small, and this study mainly focuses on the field of university education. Future studies can expand the scope of research objects, such as expanding the research objects to people of different ages and covering various training institutions, so as to improve the universality and representativeness of the theory.

Last, the research process may not be perfect enough. The generation of entrepreneurial intention is a process, which may change under the influence of time and other factors. This study is limited by experimental condition and fails to conduct long-term and effective follow-up research on experimental participants. In future studies, phased tracking experiments can be set up to observe the changes of students' entrepreneurial intention in different periods after entrepreneurship education.

Acknowledgements
We appreciate the time and effort that reviewers put into reviewing our manuscript and providing us with valuable comments and suggestions.

Authors' contributions
Conceptualization, KY and XW; formal analysis, YW; investigation, YW and LZ; theoretical framework and hypotheses development, KY and YW; data collection, XW and LZ; methodology and data analysis, YW and LZ; supervision, YW; validation, YW; writing—original draft, YW and LZ; writing—review and editing, KY, XW, YW, and LZ.

Funding
This study was supported by Special Project of High-level Talents in the Field of Publicity, Ideology and Culture in Jiangxi Province (Theoretical Research) (No. 24ZXRC08); Nanchang Social Science Planning Project (No. XW202404); Graduate Innovation Special Fund Project in Jiangxi Province (No. YC2023-S469); Innovation and Entrepreneurship Education Research Project of East China Jiaotong University (Key Project) (No. 22hjct04); National Statistical Science Research Project (Key Project) (No. 2024LZ030); National Social Science Fund Project (General project) (No. 22FXWB020); Transportation Education Science Research Project of China Transportation Education Research Society (Key Project) (No. JT2024ZD031); Jiangxi Higher Education Association project (No. ZX2-C-002); Major commissioned project of Jiangxi Social Science Youth Innovation Team (No.25WT06); National Natural Science Foundation project (No. 72262014); National Natural Science Foundation project (No. 72262014); 2024 Jiangxi Province Education Science planning project (No. 24SZZX020); 2024 Humanities and Social Science Research Project of Ministry of Education (No. 24YJA860021); Ganjuncai supports the project of funding cultural leaders; Graduate Innovation Special Fund Project in Jiangxi Province (No. YC2023-S431); The 18th Student Research Project of Jiangxi University of Finance and Economics (2023101323422109 3).

Data availability
All data relevant to the study are included in the article. In addition, the data that support the findings of this study are available from the corresponding author on reasonable request, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available.

Declarations

Ethical approval and consent to participate
Ethics approval was obtained from the ethics committee of East China Jiaotong University. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. The study was conducted with the informed consent of the participants and parents.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Nanchang Institute of Science and Technology, Nanchang, China. [2]School of Economics and Management, East China Jiaotong University, Nanchang, China. [3]School of International Economics and Trade, Jiangxi University of Finance and Economics, Nanchang, China.

Received: 2 November 2024 Accepted: 12 March 2025
Published online: 24 March 2025

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