Factors Influencing Chinese College Students’ Innovation and Entrepreneurship Ability: The Moderating Effect Test Based on Entrepreneurial Atmosphere

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Abstract: Background: Innovation and entrepreneurship education is the fundamental way to apply talent training in colleges and universities. The improvement of innovation and entrepreneurship ability is the embodiment of the success of innovation and entrepreneurship education. This paper discusses the influence mechanisms of entrepreneurial consciousness, entrepreneurial motivation, and entrepreneurial cognition on innovation and entrepreneurship ability. It analyzes the effect of the entrepreneurial atmosphere on the relationship between entrepreneurial consciousness, entrepreneurial motivation, and innovation and entrepreneurship ability. Methods: Based on the data from 1944 questionnaires, we used SPSS24.0 and AMOS22.0 software to analyze the composition and influencing factors of college students’ innovation and entrepreneurship ability. We constructed a structural equation model for empirical research. Results: The results showed that the scale of innovation and entrepreneurship ability had good reliability and validity. Entrepreneurial consciousness, entrepreneurial motivation, and entrepreneurial cognition had significant positive effects on innovation and entrepreneurship ability. Entrepreneurial atmosphere plays a moderating effect in the process that entrepreneurial consciousness affects innovation and entrepreneurship ability and entrepreneurial motivation affects innovation and entrepreneurship ability. Finally, based on China’s national conditions, we proposed suggestions to improve college students’ innovation and entrepreneurship ability from the two aspects of education and base construction to provide a reference for colleges and universities to transport entrepreneurial talents to society.

Keywords: higher education; improving classroom teaching; innovation and entrepreneurship ability; structural equation model (SEM); pedagogical issues

1. Introduction

In the 21st century, young people should receive not only traditional academic and vocational education but also innovation and entrepreneurship education. This education model, known as the Third Education Pass, was proposed by UNESCO at the “International Symposium on Education for the 21st Century” [1–4]. This important topic has reached a consensus among those conducting higher education research worldwide. Economically developed countries, such as the United States, Britain, France, Germany, Japan, Singapore, and South Korea, started paying attention to and practicing innovation and entrepreneurship education earlier than other countries [5,6]. Most foreign colleges and universities have set up relevant education courses and carried out and promoted innovation and entrepreneurship training programs [7]. Premier Li Keqiang proposed the strategic slogan of “mass entrepreneurship and innovation” in September 2014. Since then, innovation and entrepreneurship have been trending, and China has taken multiple all-encompassing measures to provide a guarantee for and support innovative entrepreneurs from top to bottom [8,9]. Currently, China’s economic development is in a state of new normalcy. The weakening growth momentum, deteriorating resources, environmental constraints,
and increasing factor costs have forced the development mode to change and have necessitated improvements in quality and efficiency. To grasp the initiative of the world pattern, China must rely on innovation to adjust its development model. At the same time, the high-quality requirements for teachers and engineers under the development of entrepreneurship education are the key to a successful university ecosystem [10]. A report of the 19th National Congress of the Communist Party of China pointed out that encouraging more social subjects to engage in innovation and entrepreneurship is the way to achieve the country’s rejuvenation. This type of national development needs talented individuals with entrepreneurial spirit and innovative ability [11].

The Ministry of Education proposed that the education goal should be changed from the original entrepreneur to all college students. At the same time, we should attach importance to the content of the reform and constantly improve the spirit of independent innovation, entrepreneurship consciousness, and innovation and entrepreneurship ability [12]. At a meeting to commemorate the 100th anniversary of the May Fourth Movement, General Secretary Xi Jinping stressed that youth are the most passionate and energetic social force in the country, and thus are the nation’s future [13]. As the most representative group of this new generation of young students, under the backdrop of “mass entrepreneurship and innovation”, college students are the primary driving force of innovation and entrepreneurship and play an important role in promoting social development. Therefore, the problem of fostering college students’ innovation and entrepreneurship ability has been a significant concern. Colleges and universities must export high-quality talent to benefit society [14]. In December 2015, the ministry of education proposed setting up innovation and entrepreneurship education courses in colleges and universities to improve students’ innovation and entrepreneurship ability and to solve the employment problems caused by the expansion of college enrollment and the slowdown of economic growth. In recent years, with the rapid development of innovation and entrepreneurship education, scholars’ research on college students’ innovation and entrepreneurship has gradually increased and deepened. The research to date has focused on the field of innovation and entrepreneurship education, the mode of university education, and the cultivation and quality of students’ ability to be innovative and entrepreneurial [1]. Innovation and entrepreneurship education is an inevitable trend in the development of college education and an inevitable path for high-quality talents. The primary purpose is to improve students’ entrepreneurial consciousness, entrepreneurial cognition, entrepreneurial motivation, and innovation and entrepreneurship ability. Therefore, studying the factors that affect college students’ innovation and entrepreneurship ability can promote employment by improving students’ entrepreneurial ability. This research holds great significance to the development of the national economy.

The primary purpose of this paper is to analyze and discuss the factors that affect college students’ innovation and entrepreneurship ability through a literature review. Based on the research and development of previous scholars, this paper explores the impact of entrepreneurial consciousness, entrepreneurial motivation, and entrepreneurial cognition on innovation and entrepreneurship ability. At the same time, it verifies the moderating effect of the entrepreneurial atmosphere in the process of entrepreneurial motivation and entrepreneurial consciousness affecting innovation and entrepreneurship ability. Finally, based on the research results, suggestions are put forward to improve the innovation and entrepreneurship education of college students, to help colleges and universities better cultivate talents with strong innovation and entrepreneurship ability.

The organization of the paper is as follows: Section 2 discusses the influencing factors of innovation and entrepreneurship ability and selects the research variables of this paper. Section 3 proposes the research hypothesis of this paper based on the relevant literature review. Section 4 mainly introduces the research method and discusses the scale design and sample selection of this paper. Section 5 analyzes the survey data to verify whether the hypothesis holds. Section 6 summarizes the conclusions of this paper, discusses the
implications of the research results for innovation and entrepreneurship education, and puts forward the research deficiencies of this paper.

2. Selection of Research Variables

Deepening the study of innovation and entrepreneurship in colleges and universities is the driving force to reform China’s higher education, and college students’ innovation and entrepreneurship practice, as well as the cultivation of college students’ innovation and entrepreneurship ability, are essential aspects of university innovation and entrepreneurship [15]. The innovation and entrepreneurial spirit of the university industry provide a vast space for college students to start a business, and, at the same time, they can actively support the development of the entrepreneurial economy [16]. In recent years, research on innovation and entrepreneurship ability has been promoted and explored in depth in practice. Scholars have done a lot of research on the influencing factors of innovation and entrepreneurship ability. Warner et al. studied how to cultivate students’ innovation and entrepreneurship ability under innovative education by giving play to their subjective initiative in cognition and practice and paying attention to the development of students’ creative consciousness, spirit, and ability [17]. Yang et al. selected two indicators of innovation spirit and entrepreneurial ability as the research objectives to investigate the impact of mass entrepreneurship education on students’ innovation and entrepreneurship ability [18]. Ding et al. used the neural network method to evaluate college students’ innovation and entrepreneurship ability. The constructed evaluation index system includes: innovation ability, innovation consciousness, entrepreneurial risk-taking behavior, and entrepreneurial risk resistance ability, which can effectively reflect the level of college students’ innovation and entrepreneurship ability [19]. Pisoni evaluated the connotation of college students’ innovation and entrepreneurship ability from the perspective of the overall concept and defined that the ability is the embodiment of knowledge skills transformation and value orientation [20]. Ridley’s research showed that innovation and entrepreneurship ability are the transformation and application ability of innovation consciousness and innovative thinking. It is the combination of human resource management ability, interpersonal communication ability, and opportunity-grasping ability [21]. Binder et al. took engineering college students as the primary research body, and proposed evaluating their innovation and entrepreneurship ability from the aspects of innovation power, innovation consciousness, and innovative thinking [22]. Liu evaluated the college students’ innovation and entrepreneurship ability by constructing a model of an innovation and entrepreneurship evaluation system composed of the four dimensions of innovation consciousness, innovative ability, innovative thinking, and innovative quality [23]. Zheng and Li studied the factors that affected college students’ innovation and entrepreneurship ability from the four dimensions of innovative thinking ability, innovative knowledge ability, innovative entrepreneurial practice, and nonintellectual factors [24]. Ji et al. studied the factors that affected college students’ innovation and entrepreneurship ability from the four dimensions of innovation and entrepreneurship knowledge ability, innovation and entrepreneurship practice ability, innovation and entrepreneurship quality, and entrepreneurial conception [25]. Yang et al. analyzed the factors affecting college students’ innovation and entrepreneurship ability with the help of Teoriya Resheniya Izobrehatelskikh Zadatch (TRIZ) theory and structural equation modeling (SEM) from the five dimensions of innovation spirit, entrepreneurial motivation, entrepreneurial practice, management ability, and implementation ability [11]. Du studied the impact of the five dimensions of innovative thinking, entrepreneurial consciousness, entrepreneurial motivation, professional knowledge, and general knowledge on innovation and entrepreneurship ability [26]. Quan et al. summarized the six dimensions of target management ability as communication and negotiation ability, entrepreneurial resilience, decision-making courage, execution ability, and innovation learning ability. They used SEM to verify the influencing factors of innovation and entrepreneurship ability [27]. According to TRIZ theory, Ran used questionnaires to study the impact of professional
knowledge, general knowledge, entrepreneurial thinking, entrepreneurial consciousness, and entrepreneurial motivation on innovation and entrepreneurship ability [28].

Based on the above analysis, most researchers only construct relevant evaluation index systems to study the influencing factors of innovation and entrepreneurship ability. Through integrating the relevant literature, this paper summarizes the four dimensions of entrepreneurial consciousness, entrepreneurial cognition, entrepreneurial motivation, and entrepreneurial atmosphere to study the impact on innovation and entrepreneurship. At the same time, it verifies the moderating effect of the entrepreneurial atmosphere in the process of influence and then provides a reference for improving college students’ innovation and entrepreneurship ability.

3. Research Hypothesis

Based on the selected research variables, we defined the “college and university students’ innovation and entrepreneurship ability” as the stimulation of entrepreneurial motivation under the premise that college students have a strong entrepreneurial consciousness. With an understanding of the entrepreneurial social environment, we can put this entrepreneurial ideal into practice [29–32]. The specific research hypotheses are as follows.

Qiao believed that entrepreneurial consciousness was the personality consciousness tendency of college students to engage in entrepreneurial activities and provided a powerful internal motivation [33]. Zhang believed that the educational concept of Chinese college students was relatively traditional and that they would not actively learn to be innovative in their use, but instead would passively accept knowledge because they lacked self-confidence and social responsibility and also had a weak sense of innovation and entrepreneurship consciousness [34]. Hu et al. believed that in the module of professional basic curriculum setting, the premise of improving innovation and entrepreneurship ability is to cultivate students’ entrepreneurial consciousness [35]. Guo used deep learning to emphasize that innovation and entrepreneurship ability should be the understanding, application, and creation of knowledge and form a naturally close relationship with the cultivation of entrepreneurial consciousness [36]. Ratten et al. believed that entrepreneurial consciousness affected individual entrepreneurial decision-making. However, entrepreneurial consciousness is influenced by the national social and cultural environment, education, and other factors. The level of entrepreneurial consciousness determines innovation and entrepreneurship ability [37]. However, we believe that entrepreneurial consciousness requires the self-awareness and perception of college students who are entrepreneurial and their ability to recognize the associated risks. Therefore, we proposed the following hypotheses.

Hypothesis 1 (H1). Entrepreneurial consciousness has a significant positive effect on innovation and entrepreneurship ability.

Qu and Liu believed that entrepreneurial cognition was a kind of cognitive model and that knowledge structure was formed systematically. This is the potential endogenous power that refers to the mental state of entrepreneurs’ entrepreneurial behavior [38]. The foundation of entrepreneurial cognition is the absorption, integration, and transformation of a large amount of entrepreneurial knowledge, and its application to practical entrepreneurial activities. Through such training, we can strengthen college students’ entrepreneurial consciousness and improve their innovation and entrepreneurship ability [39]. For entrepreneurs, innovation and entrepreneurship abilities are mainly reflected in the behavioral decision-making of business models, and the essence of this ability is the process of entrepreneurial cognition and entrepreneurial thinking triggered by the entrepreneurial environment [40]. We defined entrepreneurial cognition as an understanding of social knowledge related to entrepreneurship, including legal policies, market demand, business operations, and marketing. Therefore, we proposed the following hypothesis.
Hypothesis 2 (H2). Entrepreneurial cognition has a significant positive effect on innovation and entrepreneurship ability.

Innovation and entrepreneurship education is a view of the quality of high-quality talents with innovation and entrepreneurship spirit and innovation and entrepreneurship ability. It is also an innovation in higher education in the talent training mode under the new development pattern [41]. Researchers have tended to believe that college students’ entrepreneurship can be pursued in an excellent entrepreneurial environment and with sufficient entrepreneurial preparation. This requires a form of employment for survival and self-realization. Currently, most college students pursue entrepreneurship because of the sense of accomplishment achieved by these endeavors and their desire for work autonomy. Personal characteristics and the external environment will affect college students’ entrepreneurial motivation [42]. Entrepreneurial motivation is the driving force for those entrepreneurs who have the basic conditions for entrepreneurship and have a certain entrepreneurial ability to truly achieve entrepreneurship [43]. It is also a psychological variable that drives college students to start a business. It indirectly affects the success of entrepreneurship by improving innovation and entrepreneurship ability [44]. Therefore, we proposed the following hypothesis.

Hypothesis 3 (H3). Entrepreneurial motivation has a significant positive effect on innovation and entrepreneurship ability.

The development of an innovative country requires high-quality talent. Cultivating college students’ innovative and entrepreneurial ability is an effective way to achieve this goal, and creating an entrepreneurial atmosphere plays a vital role in this effort. A good innovation and entrepreneurship atmosphere includes a degree of emphasis on innovation and entrepreneurship, system construction, atmosphere building, policy support, and other aspects, which will help improve the college students’ innovation and entrepreneurship ability [45]. When colleges and universities attach importance to and support innovation and entrepreneurship, students will recognize and dare to try innovation and entrepreneurship more, improving their innovation and entrepreneurship ability. The school’s innovation and entrepreneurship policy and support can also stimulate students’ cognition and desire, provide a better platform, and cultivate students’ ability [39]. The construction of an entrepreneurial atmosphere can affect the thinking and behavior of college students, foster an entrepreneurial consciousness, cultivate an innovative spirit, and stimulate entrepreneurial motivation. An excellent entrepreneurial atmosphere can provide students with a good knowledge environment and informational resources, enabling them to develop a wealth of entrepreneurial skills and improve their entrepreneurial cognition. Therefore, we proposed the following hypotheses.

Hypothesis 4 (H4). Entrepreneurship atmosphere has a moderating effect between entrepreneurial motivation and innovation and entrepreneurship ability.

Hypothesis 5 (H5). Entrepreneurship atmosphere has a moderating effect between entrepreneurial cognition and innovation and entrepreneurship ability.

Hypothesis 6 (H6). Entrepreneurship atmosphere has a moderating effect between entrepreneurial consciousness and innovation and entrepreneurship ability.

This paper’s conceptual model is based on these six hypotheses, as shown in Figure 1.
4. Methodology

To verify the above assumptions, we used a combination of quantitative and qualitative methods to design a questionnaire. Then we interviewed experts in relevant fields to improve the questionnaire content. Through a literature review, we determined the research variables and measurement items, compiled a complete questionnaire, and constructed a structural equation model. It mainly includes the selection and design of questionnaires, sample selection, sample population data statistics, and data analysis. SPSS 24.0 and AMOS 22.0 were used for statistical analyses in this paper.

4.1. Scale Design

We compiled the items in this questionnaire based on the research scale of predecessors [26,46,47]. We conducted an analysis of relevant literature and interviews with experts (professors and doctors) who study innovation and entrepreneurship ability as well as with teachers engaged in innovation and entrepreneurship training and student education. The questionnaire had a total of 45 questions. The questionnaire was compiled using a Likert five-grade rating scale. The five grades—1, 2, 3, 4, and 5—represented “nonconformity, a little nonconformity, uncertainty, a little conformity, and conformity”, respectively.

4.2. Research Sample

We selected college students with engineering backgrounds in central and western China and conducted a questionnaire survey by random sampling. They all studied the innovation and entrepreneurship courses set up by the school. We distributed 2400 questionnaires, and 2200 were returned. There were 1944 valid questionnaires, and the effective recovery rate was 88.4%. The effective respondents included 1064 boys (54.73%) and 880 girls (45.27%). In terms of grade composition, there were 352 first-year college students (18.10%); 248 second-year college students (12.76%); 192 third-year college students (9.88%); 480 fourth-year college students (24.69%); 120 postgraduate first-year students (6.17%); 384 second-year graduate students (19.75%); 136 third-year graduate students (7.00%); and 32 doctoral students (1.65%). From the descriptive statistical analysis, we found the results of this survey to be roughly the same as the expected results.

5. Research Result

5.1. Model Reliability and Validity Test

In this study, we used spss24.0 software to test the reliability and validity of the sample data. We used Cronbach’s α coefficient of internal consistency reliability for the reliability test. The results are shown in Table 1. Cronbach’s α coefficients for each dimension and total scale were greater than 0.8, which indicated that the reliability of the questionnaire was high, and the consistency and reliability of the measurement model were acceptable. The factor loading, average variance extraction (AVE), and combined reliability (CR) for each variable are shown in Table 1. According to the validity criteria proposed in the

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**Figure 1.** Conceptual model.
literature [48], all factor loads were greater than 0.5, the CR was greater than 0.7, and the AVE was greater than 0.5, which showed that the overall validity of the questionnaire was better.

Table 1. Reliability and validity test results of questionnaires.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor Load</th>
<th>Composite Reliability</th>
<th>Average Variance Extract</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECa</td>
<td>0.674</td>
<td>0.744</td>
<td>0.770</td>
<td>0.838</td>
</tr>
<tr>
<td>ECb</td>
<td>0.793</td>
<td>0.811</td>
<td>0.814</td>
<td>0.918</td>
</tr>
<tr>
<td>EM</td>
<td>0.842</td>
<td>0.751</td>
<td>0.854</td>
<td>0.891</td>
</tr>
<tr>
<td>EA</td>
<td>0.870</td>
<td>0.814</td>
<td>0.851</td>
<td>0.893</td>
</tr>
<tr>
<td>IAEA</td>
<td>0.820</td>
<td>0.812</td>
<td>0.820</td>
<td>0.925</td>
</tr>
</tbody>
</table>

Total scale 0.972

Notes: ECa represents Entrepreneurial Consciousness; ECb represents Entrepreneurial Cognition; EM represents Entrepreneurial Motivation; EA represents Entrepreneurial Atmosphere; IAEA represents Innovation and Entrepreneurship Ability, the same below.

We performed a confirmatory factor analysis of the fit of the SEM model using AMOS22.0. At the same time, the discriminant validity was verified by HTMT (heterotrait-monotrait ratio) [49]. The results are shown in Tables 2 and 3. It can be seen from Table 2 that the fitting indexes of all variables were in line with the fitting criteria, which indicated that the questionnaire had good structural validity. Generally, the HTMT value is less than 0.85 (sometimes 0.9 is taken as the standard), indicating that the two factors have discriminant validity. It can be seen from Table 3 that all HTMT values were within the standard range, which indicated that the data had discriminant validity. The overall reliability and validity of the questionnaire were good.

Table 2. Model fitting indicators.

<table>
<thead>
<tr>
<th>Fitting Indicator</th>
<th>CMIN</th>
<th>DF</th>
<th>CMIN/DF</th>
<th>P</th>
<th>NFI</th>
<th>TLI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>RMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>&gt;0</td>
<td>&gt;0</td>
<td>≤3</td>
<td>&lt;0.05</td>
<td>&gt;0.90</td>
<td>&gt;0.90</td>
<td>&gt;0.90</td>
<td>&lt;0.08</td>
<td>The smaller the better.</td>
</tr>
<tr>
<td>Fitting result</td>
<td>1269.982</td>
<td>703</td>
<td>1.807</td>
<td>0.000</td>
<td>0.917</td>
<td>0.918</td>
<td>0.926</td>
<td>0.058</td>
<td>0.051</td>
</tr>
</tbody>
</table>

Notes: CMIN represents the macro function of the difference (chi-square value); DF represents Degree of Freedom; P represents significant value; NFI represents Normed Fit Index; TLI represents Tucker–Lewis Index; CFI represents Comparative Fit Index; RMSEA represents Root Mean Square Error of Approximation; The closer the RMR (Root Mean Square Residual) representation is to 0 model, the better the fitting degree is.

Table 3. HTMT (heterotrait-monotrait ratio) results.

<table>
<thead>
<tr>
<th></th>
<th>ECa</th>
<th>ECB</th>
<th>EM</th>
<th>EA</th>
<th>IAEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECa</td>
<td>-</td>
<td>0.223</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ECb</td>
<td>0.679</td>
<td>0.368</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EM</td>
<td>0.596</td>
<td>0.666</td>
<td>0.504</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IAEA</td>
<td>0.775</td>
<td>0.648</td>
<td>0.666</td>
<td>0.709</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: The values in the table represents HTMT values between two factors.

5.2. Model Hypothesis Test Analysis
5.2.1. Main Effect Test
The model’s output results are summarized in Table 4.
Table 4. Hypothesis test results.

<table>
<thead>
<tr>
<th>Hypothesis Numbering</th>
<th>Path</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Hypothesis Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>IAEA ← ECa</td>
<td>0.563</td>
<td>0.084</td>
<td>6.672</td>
<td>***</td>
<td>Support</td>
</tr>
<tr>
<td>H2</td>
<td>IAEA ← ECb</td>
<td>0.557</td>
<td>0.083</td>
<td>6.730</td>
<td>***</td>
<td>Support</td>
</tr>
<tr>
<td>H3</td>
<td>IAEA ← EM</td>
<td>0.741</td>
<td>0.089</td>
<td>8.317</td>
<td>***</td>
<td>Support</td>
</tr>
</tbody>
</table>

Notes: *** represents a significant level at \( p < 0.001 \).

In the path coefficient table, CR is the critical value. When the absolute value was greater than 1.96, the path coefficient reached the significance level of 0.05. When the absolute value was greater than 2.58, the path coefficient reached the significance level of 0.001.

Table 4 shows that the path coefficients of entrepreneurial consciousness, entrepreneurial cognition, and entrepreneurial motivation reached a significance level, which indicated that a causal relationship existed between them. The entrepreneurial consciousness was \( E = 0.563, \ CR = 6.772, \ p < 0.001 \), and the path coefficient was significant at the 0.001 level.

By strengthening publicity and encouraging entrepreneurship, students understood the changes brought about by entrepreneurship, stimulated entrepreneurial enthusiasm, and enhanced innovation and entrepreneurship ability [50–52]. Thus, we established the validity of hypothesis H1. The entrepreneurial cognition was \( E = 0.557, \ CR = 6.730, \ p < 0.001 \), and the path coefficient was significant at the 0.001 level. Entrepreneurial cognition was an individual’s objective evaluation of something (e.g., entrepreneurship), and the accumulation of cognition, to a certain extent, helped them cultivate their innovative and entrepreneurial ability [53]. Thus, we established the validity of hypothesis H2. The entrepreneurial motivation was \( E = 0.741, \ CR = 8.317, \ p < 0.001 \), and the path coefficient was significant at the 0.001 level. The stronger the entrepreneurial motivation, the stronger the innovation and entrepreneurial ability. Thus, we established the validity of hypothesis H3.

5.2.2. Moderating Effect Test

According to the moderating effect test method proposed by Duell and Schommer-Aikins, the test value of the interaction term was less than 0.05, which indicated that there was a moderating effect [54]. According to Table 5, the regression coefficients of each model reached significance. The model 2 test value was \( F = 0.013 < 0.05 \), which indicated that entrepreneurial atmosphere had a moderating effect on entrepreneurial motivation and innovation and entrepreneurial ability. Thus, we established the validity of hypothesis H4. The model 4 test value was \( F = 0.279 > 0.05 \), which indicated that entrepreneurial atmosphere had no moderating effect between entrepreneurial cognition and innovation and entrepreneurial ability. Thus, we did not establish the validity of hypothesis H5. The model 6 test value was \( F = 0.026 < 0.05 \), which indicated that entrepreneurial atmosphere had a moderating effect on entrepreneurial consciousness and innovation and entrepreneurial ability. Thus, we established the validity of hypothesis H6.

Table 5. Regression analysis of regulating effect of the entrepreneurial atmosphere.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Innovation and Entrepreneurship Ability</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EM</td>
<td>EA</td>
<td>EM</td>
<td>EM * EA</td>
<td>ECb</td>
<td>EA</td>
<td>ECB</td>
</tr>
<tr>
<td>regression coefficient B</td>
<td>0.421</td>
<td>0.321</td>
<td>0.620</td>
<td>0.628</td>
<td>-0.077</td>
<td>0.430</td>
<td>0.272</td>
</tr>
<tr>
<td>standard error</td>
<td>0.043</td>
<td>0.043</td>
<td>0.090</td>
<td>0.130</td>
<td>0.031</td>
<td>0.057</td>
<td>0.054</td>
</tr>
<tr>
<td>standardization coefficient Beta</td>
<td>0.493</td>
<td>0.371</td>
<td>0.726</td>
<td>0.726</td>
<td>-0.529</td>
<td>0.466</td>
<td>0.315</td>
</tr>
</tbody>
</table>
Table 5. Cont.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA</td>
<td>0.574</td>
<td>0.584</td>
<td>0.519</td>
<td>0.521</td>
<td>0.631</td>
<td>0.634</td>
</tr>
<tr>
<td>EM * EA</td>
<td>0.578</td>
<td>0.011</td>
<td>0.002</td>
<td>0.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0.000</td>
<td>0.013</td>
<td>0.0279</td>
<td>0.026</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: Models 1, 3, and 5 are the results of regression analysis of entrepreneurial atmosphere and entrepreneurial motivation, entrepreneurial cognition, and entrepreneurial consciousness. Models 2, 4, and 6 are the results of regression analysis of inputting entrepreneurial atmosphere and entrepreneurial motivation interaction items, entrepreneurial atmosphere and entrepreneurial cognition interaction items, entrepreneurial atmosphere and entrepreneurial consciousness interaction items. \( R^2 \) is the square of the multivariate correlation coefficient. \( \Delta R^2 \) is the amount of change in the square of the multivariate correlation coefficient. F is the significance test value of the regression equation. * Represents interaction. It means that adjustment variables are added to the original model.

To show the moderating effect of the entrepreneurial atmosphere more intuitively, we drew an effect diagram (Figure 2) using a simple slope analysis to further illustrate the trend of the moderating effect of the entrepreneurial atmosphere. Figure 2 shows that the innovative and entrepreneurial ability of college students in a relatively low entrepreneurial atmosphere increased significantly with an increase in entrepreneurial motivation and entrepreneurial consciousness. For college students studying in a higher entrepreneurial atmosphere, however, the trend of increasing innovation and entrepreneurial ability was even stronger. The comparison of Figure 2a,b shows that the entrepreneurial atmosphere played a stronger role in influencing entrepreneurial consciousness on innovation and entrepreneurship ability. This result indicated the importance of an entrepreneurial atmosphere for individuals, groups, and even the country. An excellent entrepreneurial atmosphere is conducive to the cultivation of entrepreneurial consciousness. It thus enhances the innovation and entrepreneurship ability of individuals and then improves the innovation strength of groups and countries.

Figure 2. The Moderating effect of the entrepreneurial atmosphere: (a) EA’s Moderating effect between EM and IAEA, and (b) EA’s Moderating effect between ECa and IAEA.

6. Discussion

This paper investigates some college students in Shaanxi Province who have set up innovation and entrepreneurship courses. This group has a strong entrepreneurial consciousness and a foundation for learning entrepreneurial knowledge. The education of innovation and entrepreneurship courses in schools can improve their innovation and entrepreneurship ability, but there is still a long distance from real entrepreneurship. This study discusses the factors that affect college students’ innovation and entrepreneurship ability. Through the establishment of the structural equation model, it is preliminarily assumed that entrepreneurial consciousness, entrepreneurial cognition, and entrepreneurial motivation have a positive impact on college students’ innovation and entrepreneurship ability, and the entrepreneurial atmosphere has a moderating effect. Through empirical analysis calculated by regression analysis, most of the assumptions have been verified,
but the entrepreneurial atmosphere has no moderating effect between entrepreneurial cognition and innovation and entrepreneurship ability.

(1) The impact of entrepreneurial consciousness on innovation and entrepreneurship ability.

The study found that entrepreneurial consciousness has a significant positive effect on innovation and entrepreneurship ability. To improve the entrepreneurial ability of contemporary college students, we must achieve the task of enhancing college students’ entrepreneurial consciousness in the first place. Liao et al. believed that in designing innovative courses, we should focus on cultivating students’ entrepreneurial consciousness and innovative thinking, and constantly improve students’ innovation and entrepreneurship ability [55]. Babson Business School in the United States fosters college students’ entrepreneurial consciousness by advocating the spirit of innovation and entrepreneurship, thus improving their innovation and entrepreneurship ability. The experience-oriented model of Harvard University attaches great importance to shaping and cultivating students’ entrepreneurial consciousness, thus promoting their entrepreneurial behavior [56]. There is a close relationship between college students’ entrepreneurial consciousness and entrepreneurial thinking. Open entrepreneurial thinking helps college students establish a correct entrepreneurial consciousness. Therefore, colleges and universities should help students establish a framework of entrepreneurship-related knowledge in their minds by building a complete and systematic curriculum for cultivating students’ innovation and entrepreneurship ability, so that students can learn step by step through the curriculum. To better integrate entrepreneurship consciousness into the innovation and entrepreneurship ability training curriculum, teachers can start to arrange the curriculum from the setting of teaching objectives.

(2) The impact of entrepreneurial cognition on innovation and entrepreneurship ability.

The study found that entrepreneurial cognition is helpful in improving innovation and entrepreneurship ability. For college students, entrepreneurship cognition should focus on how they learn, analyze, and use entrepreneurship-related information. It is mainly manifested in the knowledge structure and information processing process of entrepreneurial opportunity identification, entrepreneurial establishment, and growth. Higher levels of knowledge (education) usually seem to help identify opportunities, but different types of knowledge trigger the different recognition of opportunities [57]. The success of entrepreneurship is a manifestation of innovation and entrepreneurship ability, and the key to the success of entrepreneurship is that they have a more reasonable entrepreneurial cognition. Innovation and entrepreneurship ability refers to the skills, knowledge, and attitudes that entrepreneurs need to start their businesses. In the process of entrepreneurship, individuals should first evaluate the feasibility of entrepreneurship, and then pay attention to the desirability of entrepreneurship. The more ability and knowledge an individual perceives, the more helpful it is to enhance entrepreneurial confidence.

(3) The impact of entrepreneurial motivation on innovation and entrepreneurship ability.

The study found that entrepreneurial motivation has a positive impact on innovation and entrepreneurship ability. Entrepreneurial motivation is a need or desire, which encourages behavior and leads to a goal. Students with higher entrepreneurial motivation are more likely to successfully establish their enterprises than those who engage in low-motivation activities or tasks with higher personal responsibility or results [58]. The higher the entrepreneurial motivation, the more skills individuals need to learn to successfully start a business, such as insight, organization, leadership, innovation, etc. These skills are the embodiment of innovation and entrepreneurship ability.

(4) The moderating effect of the entrepreneurial atmosphere.

The study found that entrepreneurial atmosphere plays a moderating effect in the process that entrepreneurial consciousness affects innovation and entrepreneurship ability and entrepreneurial motivation affects innovation and entrepreneurship ability. College
students mainly live on campus, so the quality of the entrepreneurial atmosphere directly affects students’ entrepreneurial motivation. The entrepreneurship atmosphere plays a vital role in college students’ participation in the actual entrepreneurial process. Taking social practice as the link, goal, task, content, and requirement of innovation and entrepreneurship education, organically combining it with campus culture, carrying out various special practice activities of innovation and entrepreneurship, encouraging college students to start businesses, and vigorously create a brilliant entrepreneurial atmosphere [59]. A good entrepreneurial atmosphere can enhance students’ entrepreneurial consciousness, improve the efficiency of college students in dealing with things, and help them make decisions quickly. This is also why people in different entrepreneurial environments lead different behavior results [39]. A good environment can also improve the efficiency of entrepreneurial teams. This should be taken into account when designing innovation and entrepreneurship courses. Team integrators play a significant role in the entrepreneurial process, such as coordinating problems between teams and having good communication skills. Therefore, in the teaching process of comprehensive innovative design education, it is often formed into a group. It can create a good working atmosphere in the team, stimulate the entrepreneurial motivation of team members, give full play to the team’s cooperation ability, and improve their innovation and entrepreneurship ability [60].

7. Conclusions, Practical Enlightenment, Insufficient Research

7.1. Conclusions

This study explored the factors that affected innovation and entrepreneurship ability. Using SPSS24.0 and AMOS22.0 software, we constructed an SEM of innovation and entrepreneurship ability. We also analyzed the influence of entrepreneurial consciousness, entrepreneurial cognition, and entrepreneurial motivation on innovation and entrepreneurship ability. In addition, we verified the moderating effect of the entrepreneurial atmosphere. This can help us to understand the relationship among them and enrich the multi-factor influence model in the context of entrepreneurial education.

Entrepreneurial consciousness, entrepreneurial cognition, and entrepreneurial motivation had a significant positive effect on innovation and entrepreneurship ability. We propose that entrepreneurial atmosphere plays a moderating effect in the process of entrepreneurial motivation influencing innovation and entrepreneurship ability and entrepreneurial consciousness influencing innovation and entrepreneurship ability. In addition, combined with the survey and research results, the paper put forward specific suggestions to strengthen college entrepreneurial education. These can provide theoretical references for colleges to implement entrepreneurial education, improve the training quality of entrepreneurship talents and improve college students’ innovation and entrepreneurial ability.

7.2. Practical Enlightenment

The ability to cultivate and improve college students’ innovation and entrepreneurial ability is an essential strategic need to develop an innovative country and achieve the “Made in China 2025” goal. It requires meeting the individual needs of college students to realize their value as well as the practical need to alleviate the current employment pressure. In particular, the outbreak of Corona Virus Disease in 2020 has made the employment situation of college students even more severe. A good university environment and entrepreneurial culture atmosphere should include the best classroom environment and teaching [61,62]. Therefore, based on this study, we can make the following suggestions from the two aspects of education and base construction. These suggestions hold practical guiding significance for colleges and universities to cultivate college students’ innovation and entrepreneurship ability.

Colleges and universities should strengthen innovation and entrepreneurship education and change the teaching mode. Innovation and entrepreneurship education will redirect the attitude of college students toward entrepreneurship [63]. In the practice of entrepreneurship education, students’ innovation ability has been evaluated [64]. Foreign
teaching models could improve teaching quality [65]. Traditional teaching methods foster how students think and teach students to think that innovation is impossible subconsciously. By setting up training courses that emphasizes students’ learning, mentioned in the research like Lai et al., we should cultivate college students’ innovative thinking and systematically improve their innovation and entrepreneurship ability [66,67]. Professional knowledge and entrepreneurial cognition can ensure entrepreneurship. Wang et al. Proposed a curriculum-centered ontology, which can make students understand the learning content more effectively and improve learning efficiency [68]. Therefore, colleges and universities should appropriately increase relevant courses in classroom teaching [69,70] to strengthen students’ professional and entrepreneurial-related knowledge, stimulate their entrepreneurial motivation, and enhance innovation and creativity [71].

Colleges and universities should build a perfect practical education base, increase students’ enthusiasm to participate in mass entrepreneurship and innovation, and cultivate entrepreneurial consciousness. Practice teaching base is an essential place for college students with a certain practice scale and relatively stable to participate in internal and external practice and social practice. Because innovative thinking is the basis of entrepreneurial motivation, colleges and universities should stimulate college students’ entrepreneurial motivation through practical actions. For example, establishing a practice base for innovation and entrepreneurship education for college students could provide college students with opportunities to practice and experience the difficult process of entrepreneurship [72]. In an evaluation model of high-level vocational students’ entrepreneurial ability conducted by Ma and Wen, entrepreneurial consciousness occupied a significant proportion. Among them, cultivating responsibility and legal consciousness had a good effect on improving innovation and entrepreneurship ability [73]. This kind of realistic environment can promote students’ entrepreneurial consciousness [74,75] and make them fully understand the factors that can affect innovation and entrepreneurship ability. Students need to understand the difficulties they may encounter in the process of entrepreneurship and avoid these risks.

According to the theoretical significance of this paper, it discussed the impact of entrepreneurial consciousness, entrepreneurial motivation, and entrepreneurial cognition on innovation and entrepreneurship ability. Based on the study of the relationship between the above variables, the concept of the entrepreneurial atmosphere is included in the conceptual model. This study explored the moderating effect of the entrepreneurial atmosphere and provided a new research perspective on related topics. This paper used relevant data to establish a structural equation model to verify the relationship between innovation and entrepreneurship ability and various dimensions, which provided a reference for colleges and universities to formulate relevant policies to improve the college students’ innovation and entrepreneurship ability, and also provided profound thinking for future researchers to analyze and discuss.

In short, to improve college students' innovation and entrepreneurship ability, we must comprehensively consider various influencing factors as well as the influential relationships among these factors. All of these factors must be distinguished and mutually considered and paid attention to.

7.3. Insufficient Research

The possible shortcomings of this paper are as follows.

Small sample data and regional differences may have led to low universality of the research results. Future research should increase the number of samples and adopt a method of regional sampling for comparative study.

Based on this study, by increasing the number of samples or conducting regional follow-up surveys, the research on college students’ innovation and entrepreneurship ability in different regions of the country is carried out. Innovation and entrepreneurship education can be divided into “general” innovation and entrepreneurship enlightenment education, “embedded” innovation and entrepreneurship integration education, “professional” innovation and entrepreneurship management education, and “professional”
innovation and entrepreneurship continuing education. Therefore, different professional fields will have a certain impact on innovation and entrepreneurship. In the future, we can do special research, such as on the impact of innovation and entrepreneurship courses in different professional fields on college students’ innovation and entrepreneurship ability across the country.

The study data were all the subjective self-perception of college students, and there may be deviations. Therefore, future research should employ other ways to collect data (e.g., interviews). At the same time, the experimental hypothesis should be verified by using experimental records of contestants participating in the Innovation and Entrepreneurship Competition.

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**References**


15. Achatz, J.; Fuchs, S.; Kleintert, C.; Romann, S. We are a motley crew: Exploring the careers of men and women working at the university-industry interface. J. Technol. Manag. Innov. 2010, 5, 75–84. [CrossRef]


48. Fornell, C.; Larcker, D.F. Evaluating structural equation models with unobservable variables and measurement error: A comment. *J. Mark. Res.* 1981, 18, 39–50. [CrossRef]
55. Liao, X.; Bao, Y. The characteristics and methods of team teaching in integrated design courses: Case on “integration a n d innovation design”. *J. Art Des.* 2016, 7, 142–143.
58. Gao, S.; Zhuang, J.; Chang, Y. Influencing Factors of Student Satisfaction with the Teaching Quality of Fundamentals of Entrepreneurship Course under the Background of Innovation and Entrepreneurship. *Front. Educ.* 2021, 6, 730616. [CrossRef]
59. Hao, C. An Exploratory Research on Constructing a Model of Innovation and Entrepreneurship Education for College Students Based on Fuzzy Neural Network Algorithm. *Secur. Commun. Netw.* 2021, 1, 8. [CrossRef]