On the Entrepreneurial Intention and Entrepreneurial Behavior Path of College Students Based on the Theory of Planned Behavior

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Abstract—It is of practical significance to explore the mechanism of entrepreneurship education on college students' entrepreneurial intention, as it can provide reference for the innovations in college students' entrepreneurial ability training mode and the formulation of relevant supporting policies. At present, the relevant research on the influence mechanism of entrepreneurship education on college students' entrepreneurial intention is not deep enough and lacks relevant empirical analysis, which has led to great differences in the empirical results. Therefore, this paper explores the entrepreneurial intention and behavior path of college students based on the theory of planned behavior. First, an analysis framework of the core elements of entrepreneurial intention was built based on the theory of planned behavior, and the core elements were also analyzed. Then, a measurement model of college students' entrepreneurial intention was constructed, and the contingent value method was introduced to study college students' entrepreneurial intention. A schematic diagram of the path relationship of college students' entrepreneurial behaviors was also given, and the covariance structural equation model for all the specific elements was constructed. The rationality of the model was verified, and how the different core elements of the model are correlated with each other was also explored.

Keywords—theory of planned behavior, college students' entrepreneurship, entrepreneurial intention, entrepreneurial behavior path

1 Introduction

Nowadays in China, where "mass entrepreneurship and innovation" is highly encouraged, college students have naturally become the main target of entrepreneurial talent training, as their participation in entrepreneurial activities plays an important role in promoting national scientific and technological as well as economic development, and supporting the modernization construction of China [1–9]. However, some report shows that only less than 3% of college graduates will choose to start businesses after graduation. To improve this situation, it is necessary to change college student's entrepreneurial intention through entrepreneurship education to allow them to better

understand how capable they are of controlling the process of entrepreneurial activities and encourage their entrepreneurial behaviors [10–21]. Therefore, exploring the influence mechanism of entrepreneurship education on college students' entrepreneurial intention has certain practical significance, and will provide some reference for the innovations in college students' entrepreneurial ability training mode and the formulation of relevant supporting policies.

Alkhatib et al. [22] empirically analyzed the effects of personal traits, previous entrepreneurial experience, external environment, social norms and perceived feasibility on the entrepreneurial intention through positive and negative perceptions towards entrepreneurship. The research samples covered students aged 18–50 at private universities in Jordan, with questionnaires distributed, collected and analyzed. Quantitative methods and statistical techniques, namely factor analysis, multiple regression and path analysis, were used to process the data of 380 students who participated in the survey. The results show that entrepreneurship education, entrepreneurial experience and external environment significantly affect the positive perception towards entrepreneurship. Nieuwenhuizen and Jegede [23] drew on the established theories in the literature, such as theory of planned behavior, theory of reasoned action and theories of motivation, discussed three learning modes (formal, non-formal and informal), and realized that these three modes are all possible sources of access to entrepreneurship education. The unemployment rate of high school graduates keeps rising because they do not have the skills needed for work. Life skills training is not designed for such general schools; however, entrepreneurial practice is introduced in the regular curriculum. Life skills learning, which incorporates science and technology, is known as STEM learning. Amri et al. [24] aimed to study the implementation of STEM learning with the topic of "increasing the added value of banana chips", in order to improve the motivation and entrepreneurial attitude of the students in rural high schools. Several worksheets were used to collect data on students' motivations and entrepreneurial attitudes before and after STEM learning. The STEM-based student worksheets have been validated and can be used. It is of practical significance to study the influence of college innovation and entrepreneurship education based on virtual reality technology on college students' entrepreneurial intention. In the process of such study, Dong and Tu [25] collected and consulted a large number of literatures to obtain knowledge that is helpful for research, and then studied the effects of entrepreneurship education based on virtual reality on college students' entrepreneurial intention. The results show that the entrepreneurship education based on virtual reality has positive effects on college students' entrepreneurial intention. The relationship can be better sorted out with the results, which are basically consistent with the assumptions of the theoretical model. In order to improve students' entrepreneurial awareness and develop their relevant skills, more and more technological innovation and entrepreneurial competitions are organized inside and outside engineering schools. Huang et al. [26] used a mixed method based on the theory of planned behavior to study the outcome of innovation and entrepreneurial competition, especially the effect of participation in these competitive activities on the entrepreneurial intention of engineering students.

At present, the relevant research on the influence mechanism of entrepreneurship education on college students' entrepreneurial intention is not deep enough and lacks relevant empirical analysis, which has led to great differences in the empirical results.

At the same time, most of the studies have focused on the qualitative analysis of the effectiveness of entrepreneurship education from a single perspective, but given little consideration to the college students who are the main players in the entrepreneurial activities, and thus lack sufficient understanding of the specific entrepreneurial attitudes of college students upon graduation. Therefore, this paper shifted the focus onto the entrepreneurial intention of college students, and mainly covered the following parts: 1) an analysis framework of the core elements of entrepreneurial intention was built based on the theory of planned behavior, and the core elements were also analyzed; 2) a measurement model of college students' entrepreneurial intention was constructed, and the contingent value method was introduced to study college students' entrepreneurial intention; 3) a schematic diagram of the path relationship of college students' entrepreneurial behaviors was also given. The covariance structural equation model for all the specific elements was constructed, the rationality of the model was verified, and how the different core elements of the model are correlated with each other was also explored.

2 Analysis of the core elements of entrepreneurial intention based on the theory of planned behavior

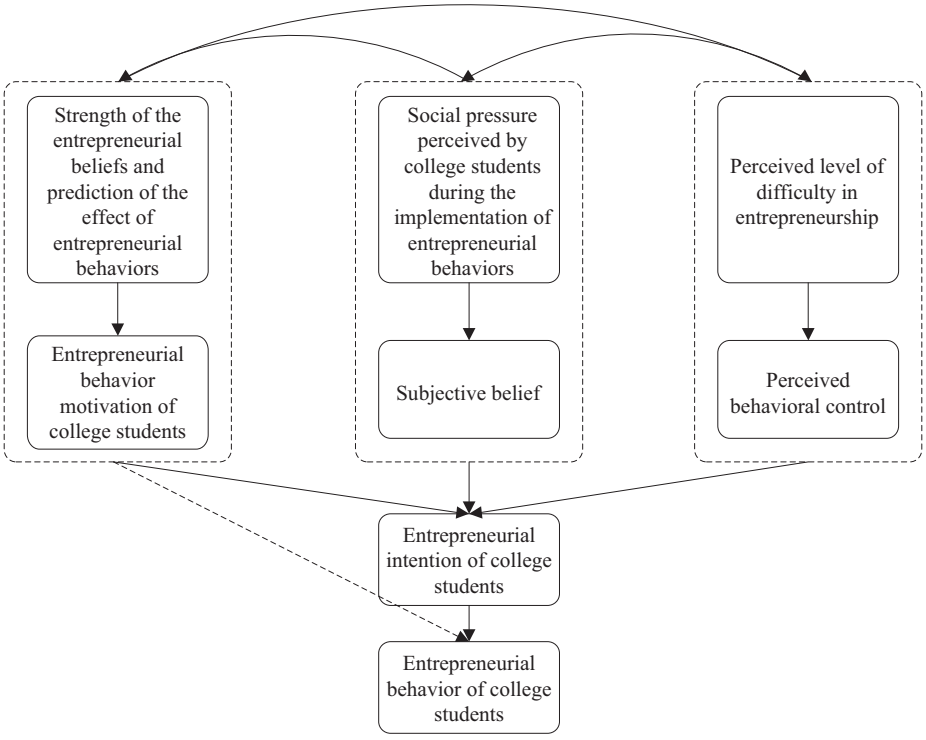

Fig. 1. Analysis framework of the core elements of entrepreneurial intention based on the theory of planned behavior

In many cases, college students cannot act or make decisions completely according to their behavioral intentions, as their behaviors are also limited by resources and the environment. Therefore, experts and scholars expanded and deepened the theory of reasoned action by adding perceived behavioral control to the original framework theory, and proposing the theory of planned behavior, which is a revision and development of the theory of reasoned action.

Perceived behavioral control refers to the degree of impediment a behavioral subject feels when deciding whether to take an action. Based on the theory of planned behavior, it can be considered that the behavioral motivation, subjective beliefs and perceived behavior control of college students are the core elements that affect the entrepreneurial intention of college students. And the entrepreneurial intention of college students is directly related to whether they will carry out entrepreneurial activities. Figure 1 presents the analysis framework of the core elements of entrepreneurial intention based on the theory of planned behavior. It can be seen that the three core elements all indirectly affect the entrepreneurial decision of college students with the entrepreneurial intention of college students as the mediating variable. The specific meanings of the three core elements are described as follows.

College students' entrepreneurial behavior motivation is defined as the acceptance level of college students with rational thinking to the upcoming entrepreneurial behavior, and the possible implementation effect of their entrepreneurial behavior depends on how strong their entrepreneurial beliefs are and their prediction of the implementation effect of their entrepreneurial behavior. Assuming that the strength of the behavioral beliefs is represented by σ_i, and that the evaluation of the behavioral result i is represented by o_i, the function of the entrepreneurial behavior motivation of college students is expressed as:

$$XY \propto \sum \sigma_i o_i \tag{1}$$

The subjective beliefs of college students in entrepreneurship refers to the social pressure perceived by college students when they are implementing entrepreneurial behaviors, characterizing the influence of significant others or groups on college students' entrepreneurial decisions. Similarly, the subjective beliefs of college students in entrepreneurship are determined by normative beliefs m_i and compliance motivation n_i, which respectively represent the expectations of significant others or groups for their entrepreneurship perceived by college students, and the fact that college students have a positive attitude towards other people's expectations. The functional expression of the subjective beliefs of college students is as follows:

$$RM \propto \sum m_i n_i \tag{2}$$

Perceived behavior control of college students' entrepreneurship refers to the level of difficulty perceived by college students with rational thinking in carrying out entrepreneurship, used to characterize the support or obstacles that college students perceive when carrying out entrepreneurship. The perceived behavioral control of college students' entrepreneurship is affected by control beliefs d_i and perceptual intensity t_i, which respectively represent the support or obstacles that college students perceive when implementing entrepreneurship, and the effect of control beliefs perceived by

college students on their entrepreneurial behavior. The perceived behavior control function of college students' entrepreneurship is expressed as follows:

$$SEC \propto \sum d_i t_i \tag{3}$$

In this study on college students' entrepreneurial intention based on the theory of planned behavior, it is assumed that all the three core elements for measurement are about college students' entrepreneurial behavior, and at the same time, all the elements need to elicit the salient beliefs while complying with the principle of consistency. Based on this, a formal questionnaire was designed.

The elicited salient beliefs are an important part of the theory of planned behavior applied to the study of college students' entrepreneurial intention. Generally speaking, to elicit the salient beliefs is to ask some simple questions to those representative target college students, so as to obtain the effects of entrepreneurial behaviors that college students can easily accept, and their stress and positive emotion perception. Common questions include: what the advantages and disadvantages of taking entrepreneurial actions are; who will exert influences on their entrepreneurship and what kind of influences they have on the specific aspects of entrepreneurship; what factors will hinder the smooth progress in the specific aspects of entrepreneurship. In this study, the answers to the above questions from all college students were sorted out, and based on the entrepreneurial beliefs that most frequently appeared in these answers, the salient beliefs were constructed, and then the questionnaire survey was further conducted.

3 Measurement model of college students' entrepreneurial intention

Contingent value method is usually used to investigate different choices of consumers like making payment or receiving compensation under certain assumptions, so as to measure the value of resources that improve consumer welfare. This paper introduced this method into the study of college students' entrepreneurial intention. In a virtual entrepreneurial environment, according to the principle of maximizing equivalent residual utility, students were directly asked questions, and based on the obtained answers, the analysis was carried out on the maximum entrepreneurial intention of college students when the behavioral motivation, subjective beliefs and perceived behavioral control are improved and the minimum entrepreneurial intention when the above elements are not improved. From this, the mediating roles of the three core elements were deduced.

The economic basis for the contingent value method is that college students have certain preferences for the types of entrepreneurship, investment, and policy support. The investment expectation for entrepreneurship is represented by a, and the policy support is represented by w, which is not subject to personal influence. The investment expectation for entrepreneurship is limited by the entrepreneurial foundation N and the entrepreneurial investment t per unit time. Under this condition, the problem of college students obtaining the maximum entrepreneurial intention can be expressed by the following formula:

$$MaxV = V(a, w) \tag{4}$$

Satisfying:

$$\sum_i t_i a_i = N \tag{5}$$

The function of the effect of a_i on entrepreneurial intention is:

$$a_i = \psi(t, w, N) \tag{6}$$

The indirect utility function is:

$$U(t, w, N) = v[\xi(t, w, N), w] \tag{7}$$

At this time, the personal utility of college students' entrepreneurship is a function of the entrepreneurial investment per unit time, entrepreneurial foundation and policy support. Assuming that t and N remain unchanged and that the policy support increases from w_0 to w_1, the corresponding personal utility of college students' entrepreneurship will increase from $v_0 = u(t,w_0,N)$ to $v_1 = u(t,w_1,N)$.

Now suppose that this change in the personal utility of college students' entrepreneurship is an improvement, that is, $w_0 \leq w_1$, at this time:

$$v_0 = u(t, w_0, N) \leq v_1 = u(t, w_1, N) \tag{8}$$

In order to keep the personal utility of college students' entrepreneurship at the level before improvement, that is, $v_0 = u(t,w_1,N)$, college students need to increase their investment expectations for entrepreneurship. This increase can be regarded as the maximum entrepreneurial intention of college students.

On the contrary, if the support of the policy is reduced, the positive effect on the entrepreneurship of college students will disappear, that is, $w_0 \geq w_1$, and then the utility of college students' entrepreneurship is:

$$v_0 = u(t, w_0, N) \geq v_1 = u(t, w_1, N) \tag{9}$$

In order to keep the personal utility of college students' entrepreneurial intention at the level before improvement, that is, $v_0 = (t,w_0,N)$, college students need to reduce their expectations for policy support. This reduction can be regarded as the minimum entrepreneurial intention of college students.

Based on the theory of utility maximization, a random utility model was constructed for the study of college students' entrepreneurial intention, which, from the perspective of probability, defined the degrees to which the entrepreneurial behavior of college students is affected by different factors. According to this theory, college students believe that if the value of improving behavioral motivation, subjective beliefs, and perceived behavioral control is higher than the cost of such improvement, then they will have a positive attitude towards the investment expectations of entrepreneurship. But if the cost of improving behavioral motivation, subjective beliefs and perceived behavioral control is excessive, so that the effort is not in proportion to the reward, then they will have a negative attitude towards the investment expectations of entrepreneurship.

The model assumes that the personal utility V of college student x in entrepreneurship can be divided into two parts – the fixed utility term U and the stochastic utility term γ, which are respectively composed of observable and unobservable influencing factors, and then there is:

$$V = U + \gamma \tag{10}$$

The double-bounded dichotomous choice first provides college student i with an initial entrepreneurial intention value Y_i, and the college student answers he has "the intention" or "no intention" to this entrepreneurial intention value. If the college student agrees to increase his investment expectation for entrepreneurship or reduce his expectation for policy support, he will be provided with another higher entrepreneurial intention value Y_i^v. If the college student does not agree to increase his investment expectation for entrepreneurship or reduce his expectation for policy support, he will be provided with another lower entrepreneurial intention value Y_i^p. It is assumed that the distribution parameters estimated by the maximum likelihood estimation method are denoted by Φ and Ψ. The probability of the college student accepting this entrepreneurial intention value can be calculated by the following formula:

$$T_i\ (\text{'}Willing\text{'}) = 1 - \{1 + exp[\Phi - \Psi\ (Y_i)\ ]\}^{-1} \tag{11}$$

The double-bounded dichotomous choice first provides college students with an initial entrepreneurial intention value. If the college students agree to increase their investment expectations for entrepreneurship or reduce their expectations for policy support, they will be divided into four categories by their response, which are "having the intention – having no intention". "having the intention – having no intention", "having no intention – having the intention" and "having no intention – having no intention", of which the probabilities are respectively denoted as T_i^{BB}, T_i^{BM}, T_i^{MB} and T_i^{MM}, and the corresponding dummy variables are represented by DS_{BB}, DS_{BM}, DS_{MB} and DS_{MM}. According to the principle of stochastic utility maximization, the discrete responses of college students to the entrepreneurial intention value can be regarded as the process of maximizing the personal utility of college students' entrepreneurship. Therefore, the probabilities of the four kinds of intention responses that college students may give can be calculated by the following formula:

$$Ln\ (K) = \sum_{i=1}^{m} \left[DS_{BB} Ln(T_i^{BB}) + DS_{BM} Ln(T_i^{BM}) + DS_{MB} Ln(T_i^{MB}) + DS_{MM} Ln(T_i^{MM}) \right] \tag{12}$$

Assuming that the entrepreneurial intention value coefficient is represented by Ψ, that the estimated constant value by Φ, that the average value of the core element variables by A, and that the corresponding coefficient of each core element variable is represented by α, then the average entrepreneurial intention of college students can be calculated by the following formula:

$$O(EW) = -\frac{1}{\Psi} Ln\left[1 + exp\left(\Phi + \sum_{j=1}^{l} \alpha_j A_j \right) \right] \tag{13}$$

4 Correlation analysis of the core elements of entrepreneurial intention

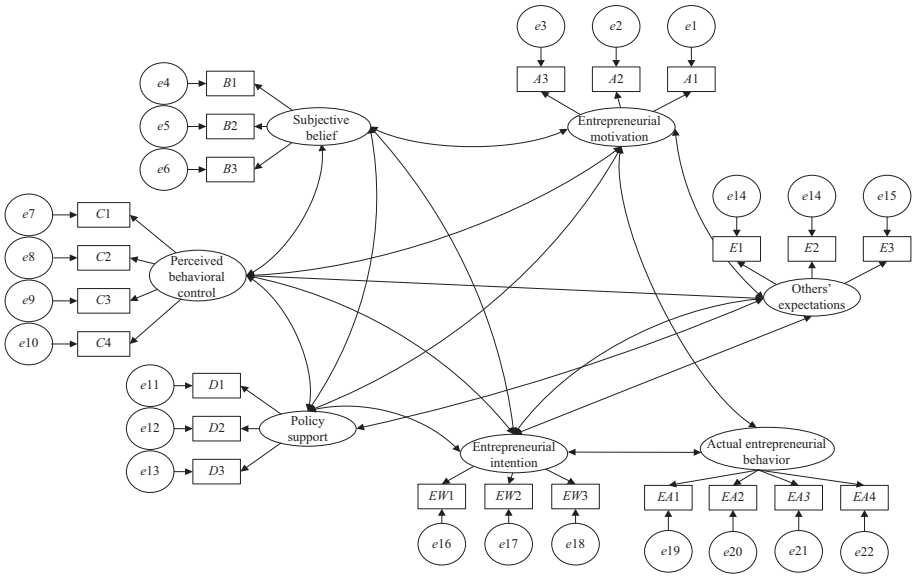

Fig. 2. Path relationship of college students' entrepreneurial behaviors

Figure 2 shows the path relationship of college students' entrepreneurial behaviors. In order to verify the rationality of the model and explore how correlated the different core elements of the model are with each other, a covariance structural equation model was constructed, incorporating the three core elements plus all the specific elements including others' expectations and policy support. The model follows the maximum likelihood estimation procedure, which aims to minimize the difference between the observed and estimated covariance matrices to obtain the best fitting structure that is closer to the intrinsic relationship of the data.

The model seeks to minimize the differences between the observed and estimated value matrices of all specific elements, and obtain an optimal fitting structure that is more in line with the internal correlation of the specific element values based on the maximum likelihood estimation algorithm process. This paper chooses the covariance structural equation model to explain the relationship between the core elements and the entrepreneurial intention of college students.

Assuming that the latent variables that cannot be directly observed are represented by ξ and μ, that the observed variables that can be measured by direct observation and scale are represented by A and B, and that the coefficient matrices of A to ξ and B to μ representing the correlation between the two are denoted respectively as matrices Ω_A and Ω_B. The measurement errors of A and B are denoted as σ and γ, respectively. In the structural equation model, the relationship expression between μ and B is described by the following equation:

$$B = \Omega_B \mu + \sigma \tag{14}$$

The relational expression of ξ and A is described by the following equation:

$$A = \Omega_A \xi + \gamma \tag{15}$$

Suppose that the coefficient matrices representing the correlation between endogenous latent variables and exogenous latent variables are represented by Y and Π, respectively, and that the error term is represented by τ. Equation 16 gives the relational expression of the latent variables:

$$\Gamma = Y\mu + \Pi\xi + \tau \tag{16}$$

5 Experimental results and analysis

Table 1. Analysis results of the core elements of entrepreneurial intention based on the theory of planned behavior

Core Element	Specific Element	Rotating Component Matrix			
		Component 1	Component 2	Component 3	Component 4
Behavioral motive	*A*1	0.854	0.261	0.013	0.341
	*A*2	0.741	0.294	0.026	0.358
	*A*3	0.625	0.137	0.022	0.637
Subjective beliefs	*B*1	0.362	0.815	0.216	0.025
	*B*2	0.195	0.836	0.298	0.096
	*B*3	0.182	0.749	0.243	0.047
Perceived behavioral control	*C*1	0.263	0.251	0.958	0.028
	*C*2	0.178	0.368	0.837	0.214
	*C*3	0.025	0.411	0.862	0.458
	*C*4	0.145	0.331	0.572	0.278
Entrepreneurial intention	*EW*1	0.295	–0.062	–0.025	0.826
	*EW*2	0.348	0.169	–0.058	0.837
	*EW*3	0.427	0.135	0.015	0.619
Eigenvalue		0.625	2.519	0.695	1.421
Variance contribution rate		21.369	17.528	25.418	9.528
Cumulative variance contribution rate		25.415	35.412	56.237	66.342

In order to verify the validity of the scale of core elements of entrepreneurial intention, exploratory factor analysis was conducted, and the generated rotating component matrix is shown in Table 1. If only one factor is generated from the core elements after exploratory factor analysis, it means that the three elements, i.e. behavioral motivation, subjective beliefs and perceived behavioral control, of college students are ideally

unidimensional. In addition, if, after exploratory factor analysis, the load coefficient of each core element is high and there is no cross-loading, it means that the three elements have ideal discriminatory validity. After processing based on principal component analysis and maximum variation method, there were two factors with an eigenvalue of greater than 1, which correspond to components 1 and 3, the two constructs of the theory of planned behavior.

Figure 3 shows the entrepreneurial motivations of college students. It can be seen that the entrepreneurial motivations of college students mainly include four types: value judgment, career choice, ability training, and career development. The proportions of college students who chose "high entrepreneurial intention" in the survey questions about entrepreneurial motivations are only 8.5%, 12.5%, 13.1% and 13.4%, respectively, the proportions of those who chose "low entrepreneurial intention" are 5.1%, 4.6%, 3.8%, and 4.1%, respectively. Specifically, the number of college students who chose "high entrepreneurial intention" for ability training is 3.45 times that of the students with "low entrepreneurial intention". This shows that college students generally believe that entrepreneurship is the embodiment of personal value, as well as an opportunity for personal career development and ability training.

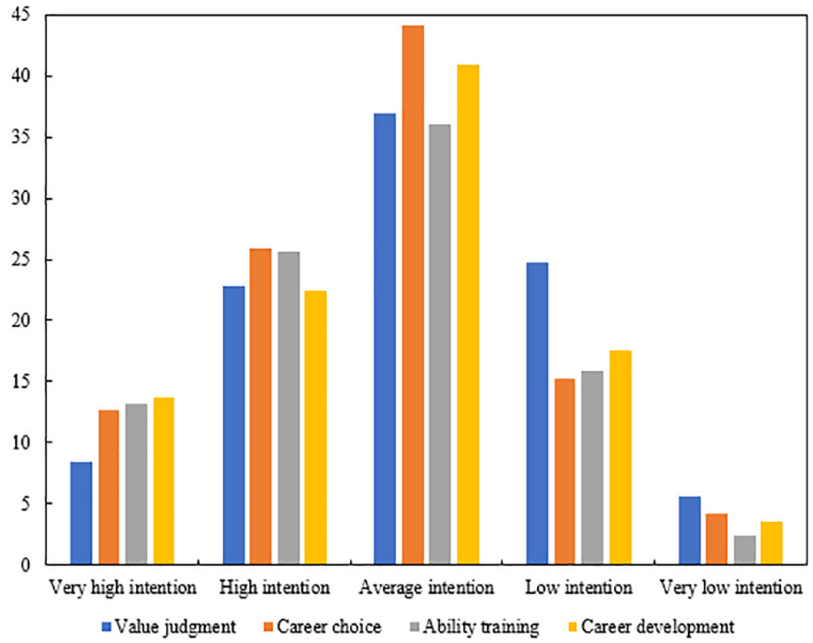

Fig. 3. Entrepreneurial motivations of college students

Figure 4 shows the subjective beliefs of college students in entrepreneurship. It can be seen that the subjective beliefs of college students in entrepreneurship are reflected in the four choices that college students may make when encountering obstacles: willing to overcome, considering overcoming, going to overcome, and actively overcoming the obstacles. The proportions of college students who chose "high entrepreneurial

intention" in all survey questions regarding subjective beliefs in entrepreneurship are only 17.8%, 16.9%, 25.7%, and 23.8%, respectively, and those of the college students who chose "low entrepreneurial intention" in these questions are 2.1%, 5.6%, 8.5%, and 4.6%, respectively. Specifically, the number of students who chose "high entrepreneurial intention" in "willing to overcome obstacles in entrepreneurship" is 8.47 times that of students who chose "low entrepreneurial intention". It shows that college students are willing to overcome various difficulties in order to achieve entrepreneurial success, and that their subjective beliefs are generally strong.

Figure 5 shows the perceived behavioral control of college students in entrepreneurship, after measurement of college students' perceived difficulties in carrying out entrepreneurship activities. It can be seen that the proportions of the college students who chose "high entrepreneurial intention" in the survey questions regarding entrepreneurial competency, difficulty in acquisition of entrepreneurial resources and difficulty in entrepreneurial investment are only 25.1%, 20.3%, and 15.6%, respectively, while those of the college students who chose "low entrepreneurial intention" are 0.8%, 2.7% and 3.2%, respectively. Specifically, the number of college students who chose "high entrepreneurial intention" in the category of difficulty in entrepreneurial investment perceived by college students is 4.87 times that of students who chose "low entrepreneurial intention". This shows that college students do not think that entrepreneurial competency, difficulty in acquisition of entrepreneurial resources, and difficulty in entrepreneurial investment are insurmountable obstacles, which proves that the college students who participated in the study have high beliefs in entrepreneurship.

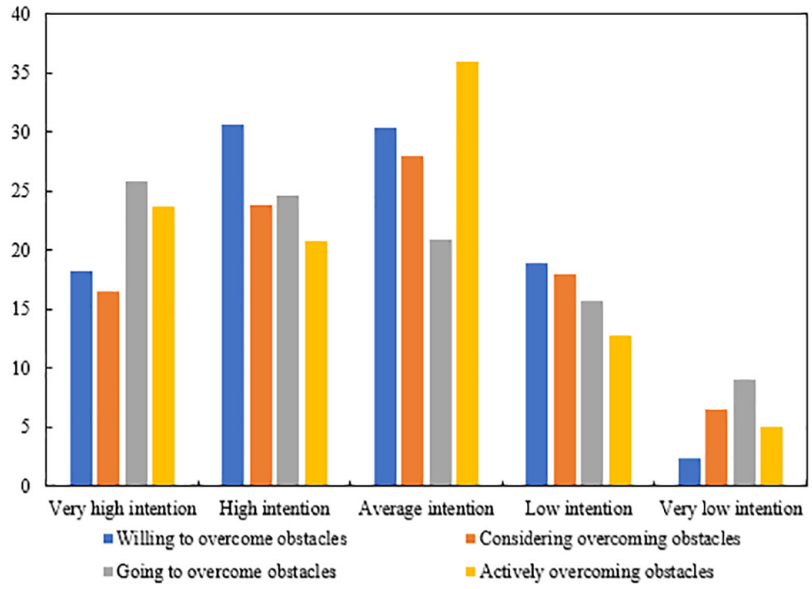

Fig. 4. Subjective beliefs of college students in entrepreneurship

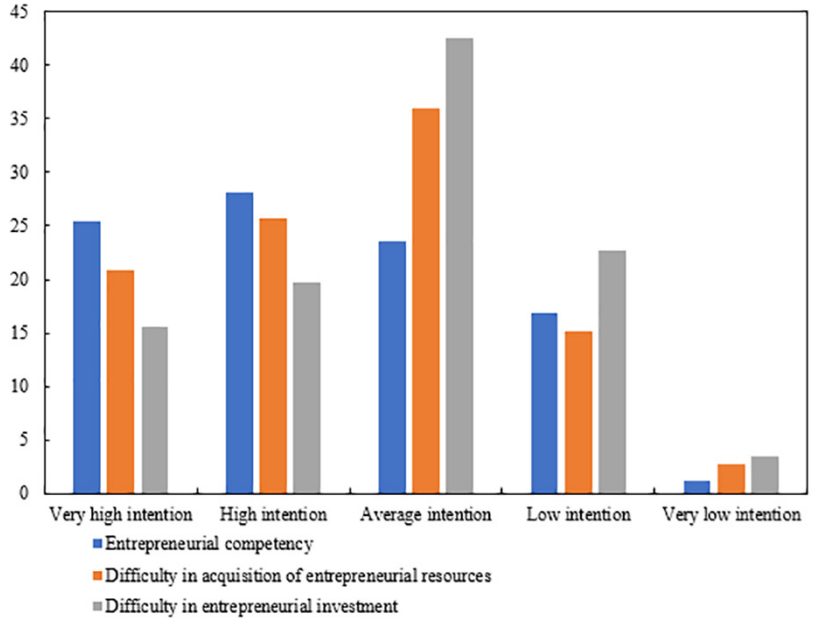

Fig. 5. Perceived behavioral control of college students in entrepreneurship

Table 2. Descriptive statistics of college students' entrepreneurial intention

Element	Min	Max	Mean	SD	Skewness	Kurtosis
*A*1	0	6	3.25	1.623	−0.514	−1.205
*A*2	0	6	3.02	1.258	−0.174	−1.639
*A*3	0	6	3.62	1.025	−0.296	−0.927
*B*1	0	6	3.59	1.419	−0.335	−0.925
*B*2	0	6	3.41	1.362	−0.028	−0.961
*B*3	0	6	3.22	1.528	−0.033	−0.947
*C*1	0	6	3.15	1.027	−0.258	−0.936
*C*2	0	6	3.11	1.639	−0.192	−0.915
*C*3	0	6	3.29	1.157	−0.117	−0.928
*C*4	0	6	3.62	1.024	−0.163	−0.917
*D*1	0	6	3.14	1.326	−0.352	−0.952
*D*2	0	6	3.27	1.527	−0.382	−0.936
*D*3	0	6	3.02	1.036	−0.252	−0.918
*E*1	0	6	2.62	1.257	0.563	−1.352
*E*2	0	6	2.05	1.269	0.281	−1.174
*E*3	0	6	2.11	1.205	0.346	−1.325

Table 2 presents the descriptive statistics of college students' entrepreneurial intentions. It can be seen that the mean values of the observed variables regarding the three elements of college students, i.e. entrepreneurial behavior motivation, subjective beliefs and perceived behavioral control, are all greater than 3, indicating that the college students participating in the study have a very positive attitude towards entrepreneurial activities. The mean values of the observed variable regarding government support are also greater than 3, indicating that the local government supports college students' entrepreneurship. The mean values of the observed variables regarding others' expectations are greater than 2, indicating that significant others or groups have an average level of expectations for their entrepreneurship, and hold a neutral attitude towards the entrepreneurial performance of college students.

6 Conclusions

This paper explored the entrepreneurial intention and behavior path of college students based on the theory of planned behavior. First, an analysis framework of the core elements of entrepreneurial intention was built based on the theory of planned behavior, and the core elements were also analyzed. Then, a measurement model of college students' entrepreneurial intention was constructed, and the contingent value method was introduced to study college students' entrepreneurial intention. A schematic diagram of the path relationship of college students' entrepreneurial behaviors was also given, and the covariance structural equation model for all the specific elements was constructed. Through the experiment, the analysis results of the core elements of entrepreneurial intention based on the theory of planned behavior were given. After exploratory factor analysis, the load coefficients of all core elements were found to be high and there was no cross-loading, indicating that the three elements have ideal discriminatory validity. College students' entrepreneurial motivations, entrepreneurial subjective beliefs and perceived behavior control were also shown, and the descriptive statistics of college students' entrepreneurial intentions were given, and based on this, the analysis results were presented.

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