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The Influence of Career Planning Education on College Students' Entrepreneurial Intention: An Analysis of Mediating and Moderating Effects

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ABSTRACT

Purpose - This study investigates the impact of career planning education on university students' entrepreneurial intentions by examining the mediating roles of self-efficacy and perceived behavioral control, as well as the moderating effects of digital competency and risk propensity.

Design/methodology/approach - Data were collected from 450 university students through a structured questionnaire. The research model was tested using structural equation modeling with bootstrapping procedures for mediation analysis and hierarchical regression for moderation effects.

Findings - The results reveal that career planning education positively influences entrepreneurial intentions both directly (β =0.312, p<0.01) and indirectly through self-efficacy (β =0.178, p<0.01) and perceived behavioral control (β =0.133, p<0.01). Digital competency (β =0.156, p<0.01) and risk propensity (β =0.143, p<0.01) positively moderate these relationships. Practical implications - The findings suggest that higher education institutions should integrate digital skills development into career planning curricula and tailor educational approaches to students' individual characteristics to enhance entrepreneurial intentions effectively. Originality/value - This study extends the theory of planned behavior by incorporating digital competency as a crucial moderating factor and demonstrating the specific mechanisms through which career planning education influences entrepreneurial intentions in the digital era.

Keywords: Career planning education, Entrepreneurial intentions, Self-efficacy, Perceived behavioral control, Digital competency, Risk propensity, University students, Theory of planned behavior, Mediation effects, Moderation effects

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1. Introduction

Since China has widely carried out “mass entrepreneurship and innovation”, colleges and universities have been actively carrying out college students' employment and entrepreneurship education. The improvement of college students' employment and entrepreneurship ability is not only related to their individual career development, but also to the demand of the country and society for talents. Through systematic career planning education, students will have a better understanding of their own strengths, interests and values, and provide a clear direction for their career orientation [1-4]. At the same time, career planning education can cultivate students' innovative spirit, teamwork consciousness and resilience, so that they can better adapt to the diverse career environment in the future [5-7]. In conclusion, in this era of globalization and knowledge economy, it is the mission of colleges and universities and the expectation of the society to enhance the employment and entrepreneurial ability of college students.

The importance of career planning education in college students' education cannot be ignored. Different from the past view of career choice that regards employment as the only choice after graduation, with the development of social economy and the change of employment situation, entrepreneurship has become an important career development direction considered by many college students [8-9]. Innovation and entrepreneurship education in colleges and universities helps college students better understand and grasp entrepreneurial opportunities by teaching entrepreneurial knowledge, cultivating entrepreneurial awareness and improving entrepreneurial skills [10]. And college students' career planning can provide direction for college students' entrepreneurship [11]. Career planning enables college students to set long-term and short-term career goals according to their own interests, abilities and market demand, and a clear career development direction not only helps college students find a suitable position for themselves in the future job market, but also provides continuous motivation for their career development [12-14]. Detailed career planning will also give more impetus to college students to study and practice purposefully, so as to improve their comprehensive quality and competitiveness [15].

Peng, X. emphasizes that the combination of career planning and innovation and entrepreneurship education is an important measure to alleviate the employment pressure of college graduates, and in the context of the integration of innovation and entrepreneurship and professional education, it promotes the all-round development of college students by upgrading the career planning education and cultivates their entrepreneurial ability [16]. Zhang, R. et al. believe that career planning can help students to make clear that entrepreneurship has a clear role in their personal career development, and by combining career planning with innovation and entrepreneurship education, college students can acquire entrepreneurial experience and cultivate entrepreneurial spirit in educational practice, which is conducive to stimulating the entrepreneurial willingness and entrepreneurial ability of college students [17]. Han, Y. showed that the significance of innovation and entrepreneurship education for college students is discussed from the perspective of career planning, which provides college students with a reasonable career path planning that Combined with entrepreneurship education in order to tap the inner potential of college students, it can help college students better accomplish entrepreneurship [18]. Wang, J. studied the entrepreneurial willingness of students in higher vocational colleges and universities under the guidance of career planning education, and found that higher vocational students, although their level of education and knowledge is insufficient, are more likely to have a strong entrepreneurial willingness by virtue of their outstanding professional skills, and the institutions should make use of the guiding function of career planning to enhance the students' innovation ability[19]. Zhang, R. et al. proposed to design the integration course of career planning and innovation and entrepreneurship education, which on the one hand provides employment guidance and services for college students, and on the other hand cultivates their work-critical skills through practical projects, which provides a solid foundation for the career

development and innovation path of college students[20]. Weijia, C. et al. elaborated the development strategy of improving students' career planning ability from the levels of the state, colleges and universities as well as the students' personal level. development strategies to enhance students' career planning ability, indicating that the state should formulate clear guidelines and policies to create a favorable environment, colleges and universities should adjust their curricula and education to adapt to the development of the industry, and individuals should accumulate work experience through practical activities, which will help college students to successfully cope with the challenges of the workplace and realize their career aspirations [21].

The main objective of this paper is therefore to investigate the complex relationships between the career-planning education and entrepreneurial intention of university students, underlining especially the power of mediating and moderating effects. This paper will thus contribute both on the theoretical and practical fronts of entrepreneurship education through a close empirical investigation of such relations.

2. Study design

2.1. Study model construction

This framework, as it comes out in Figure 1, places career planning education as the independent variable and puts entrepreneurial intention as the dependent variable but has various mediating and moderating factors that indicate the complexity of this relationship.

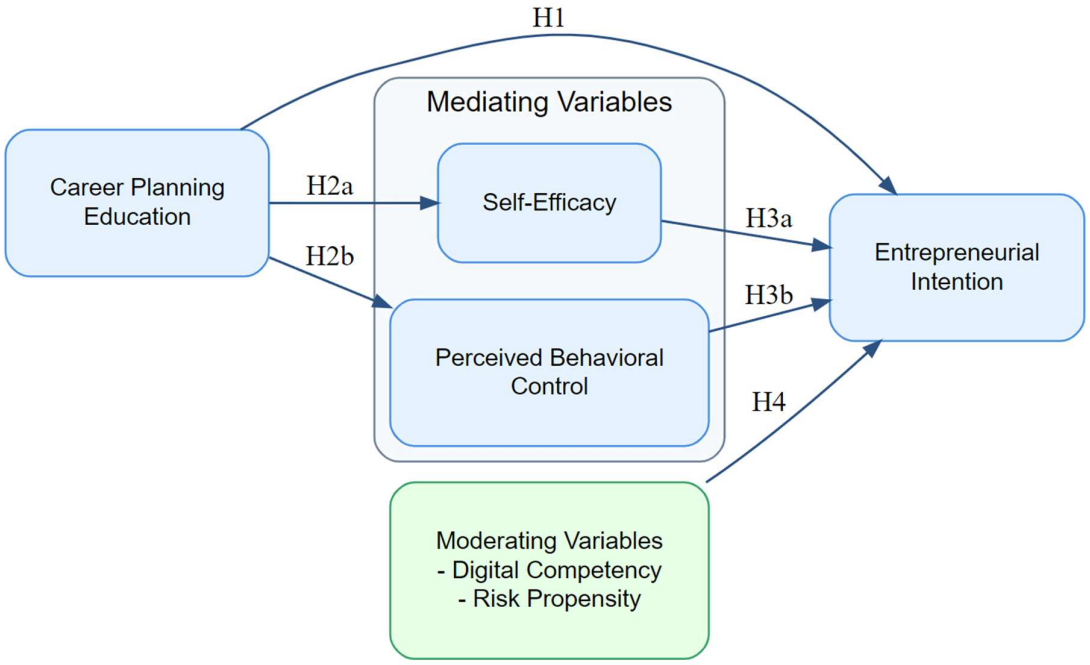

Fig. 1. Theoretical Research Model of Career Planning Education's Impact on Entrepreneurial Intention

2.2. Study hypothesis

Following the theoretical framework and research model, several hypotheses are put forward in this study with regard to the relationship between career planning education and entrepreneurial intention. The following hypothesis is advanced:

H1: Career planning education positively impacts the direct effect of university students' entrepreneurial intention.

H2a: Self-efficacy mediates the impact of the education in career planning on entrepreneurial intentions.

H2b: Perceived behavioral control mediates the influence of career-planning education in respect to entrepreneurial intentions.

H3a: Self-efficacy positively impacts the entrepreneurial intention.

H3b: Perceived behavioral control positively influences entrepreneurial intentions.

H4a: Digital competence moderates the relationship between career planning education and entrepreneurial intentions.

H4b: Risk propensity moderates the relation between career planning education and entrepreneurial intentions.

2.3. Variable Measurements

The variables are measured using multi-item scales adapted from previous studies, with all items rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). As shown in Table 1, each construct is measured through multiple indicators to ensure comprehensive coverage of the theoretical dimensions.

Table 1. Measurement Items and Sources

Variable	Dimension	Items
Career Planning Education	Content Quality	CPE1: The course content is comprehensive and practical
	Teaching Methods	CPE2: Interactive teaching methods are employed effectively
	Practice Integration	CPE3: Real-world cases are integrated into teaching
Self-Efficacy	Task Confidence	SE1: I can solve entrepreneurial problems effectively
	Resource Mobilization	SE2: I can gather necessary resources for startup
	Risk Management	SE3: I can manage business risks appropriately
Perceived Behavioral Control	Resource Access	PBC1: I have access to entrepreneurial resources
	Skill Mastery	PBC2: I possess necessary entrepreneurial skills
	Support Network	PBC3: I have supportive entrepreneurial networks
Entrepreneurial Intention	Career Choice	EI1: I intend to start my own business
	Time Investment	EI2: I plan to devote time to entrepreneurship
	Resource Commitment	EI3: I will invest resources in my venture

2.4. Questionnaire Design and Data Collection

A pilot study was conducted with 30 university students to refine the instrument, ensuring clarity and relevance. Following refinement, data collection employed a stratified random sampling approach across multiple universities. The online survey was distributed through institutional email systems and professional networks. The final sample comprised 450 valid responses, representing a response rate of 75%.

2.5. Data Analysis Methods

The study employs a comprehensive analytical approach using SmartPLS 3.0 for structural equation modeling. We first conduct reliability and validity tests using Cronbach's alpha and composite reliability measures. First assessing the measurement model through confirmatory factor analysis, then evaluating the structural model. Mediation effects are analyzed using bootstrapping procedures with 5,000 resamples.

3. Data analysis and hypothesis testing

3.1. Descriptive Statistical Analysis of Samples

The demographic characteristics and descriptive statistics of the sample reveal a diverse representation of university students. As shown in Table 2, the sample exhibits balanced gender distribution and varied academic backgrounds. The participants' age distribution indicates a predominant young adult population, consistent with typical university demographics. Of particular note is the high proportion of students with prior exposure to entrepreneurship education, suggesting a foundational understanding of business concepts.

Table 2. Sample Demographic Characteristics (N=450)

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	235	52.2
	Female	215	47.8
Age	18-20	156	34.7
	21-23	198	44.0
	24-26	76	16.9
	Above 26	20	4.4
Academic Major	Business	185	41.1
	Engineering	98	21.8
	Computer Science	87	19.3
	Others	80	17.8
Year of Study	First	89	19.8
	Second	123	27.3
	Third	156	34.7
	Fourth	82	18.2
Prior Entrepreneurship Course	Yes	278	61.8
	No	172	38.2

3.1.1. Reliability Analysis. The reliability analysis employs multiple criteria to ensure measurement consistency. The results demonstrate strong internal consistency across all constructs, adhering to recommended thresholds. As shown in Table 3, all measures exceed the standard reliability criteria, indicating robust measurement reliability.

Table 3. Reliability Analysis Results

Construct	Cronbach's α	Composite Reliability	Average Variance Extracted	Item Number
Career Planning Education	0.892	0.915	0.683	5
Self-Efficacy	0.876	0.901	0.712	4
Perceived Behavioral Control	0.883	0.908	0.695	4
Entrepreneurial Intention	0.901	0.923	0.747	5
Digital Competency	0.865	0.894	0.677	3
Risk Propensity	0.859	0.888	0.665	3

3.1.2. Validity Analysis. The validity assessment encompasses both convergent and discriminant validity tests. Table 4 presents the inter-construct correlation matrix and square root of AVE values along the diagonal, demonstrating strong construct validity. The factor loadings and cross-loadings pattern supports the discriminant validity of the measures.

Table 4. Construct Correlations and Discriminant Validity

Construct	CPE	SE	PBC	EI	DC	RP	√ AVE
Career Planning Education (CPE)	0.827						0.827
Self-Efficacy (SE)	0.564	0.844					0.844
Perceived Behavioral Control (PBC)	0.512	0.598	0.834				0.834
Entrepreneurial Intention (EI)	0.623	0.645	0.587	0.864			0.864
Digital Competency (DC)	0.487	0.523	0.492	0.534	0.823		0.823
Risk Propensity (RP)	0.445	0.478	0.465	0.512	0.467	0.815	0.815

Note: Bold diagonal elements are square roots of AVE; Off-diagonal elements are correlations between constructs.

3.2. Correlation Analysis

The correlation analysis reveals significant relationships among key variables in the research model. As shown in Table 5, the correlation coefficients indicate strong positive associations between career planning education and entrepreneurial intentions, supporting the theoretical framework. Figure 2 visualizes these relationships through a correlation heatmap.

Table 5. Pearson Correlation Matrix and Descriptive Statistics

Variables	Mean	SD	1	2	3	4	5	6
1. Career Planning Education	3.84	0.76	1.00					
2. Self-Efficacy	3.62	0.82	0.564**	1.00				
3. Perceived Behavioral Control	3.71	0.79	0.512**	0.598**	1.00			
4. Entrepreneurial Intention	3.93	0.85	0.623**	0.645**	0.587**	1.00		
5. Digital Competency	3.77	0.73	0.487**	0.523**	0.492**	0.534**	1.00	
6. Risk Propensity	3.56	0.81	0.445**	0.478**	0.465**	0.512**	0.467**	1.00

Note: ** p<0.01

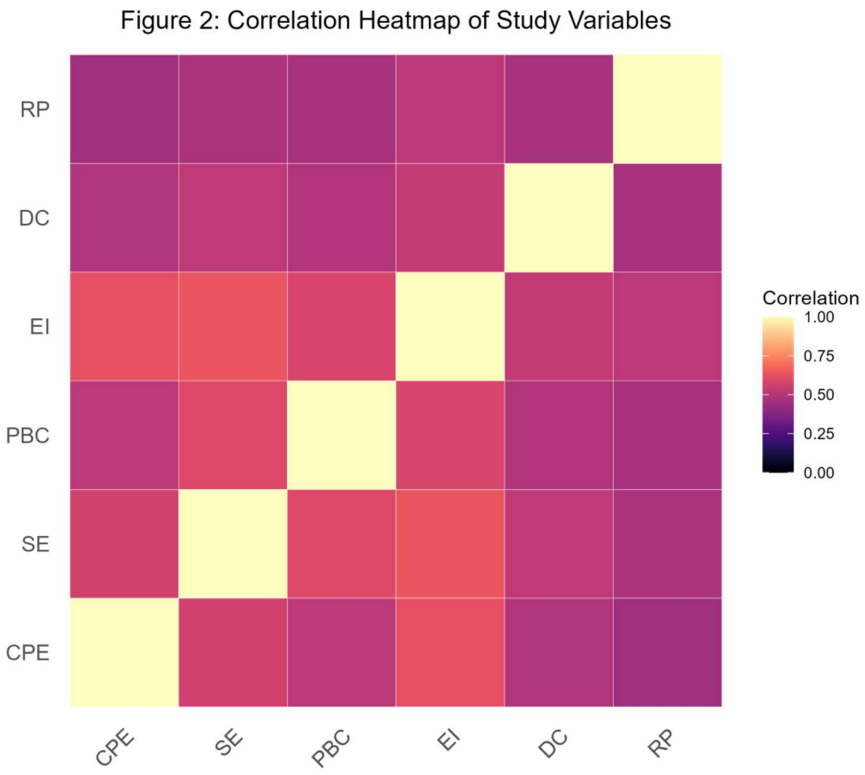

Figure 2. Correlation Heatmap of Study Variables

3.3. Regression analysis and hypothesis testing

3.3.1. Main Effect Analysis. The main effect analysis examines the direct relationship between career planning education and entrepreneurial intention. Table 6 presents the regression results, demonstrating significant positive effects. Figure 3 illustrates the linear relationship between these variables.

Table 6. Main Effect Regression Results

Predictor	B	SE	t-value	p-value	R^2	Adjusted R^2
Constant	1.245	0.187	6.658	< 0.001	0.388	0.385
Career Planning Education	0.623	0.048	12.979	< 0.001		
Control Variables						
Age	0.142	0.045	3.156	< 0.01		
Gender	0.098	0.043	2.279	< 0.05		
Academic Major	0.115	0.044	2.614	< 0.01		

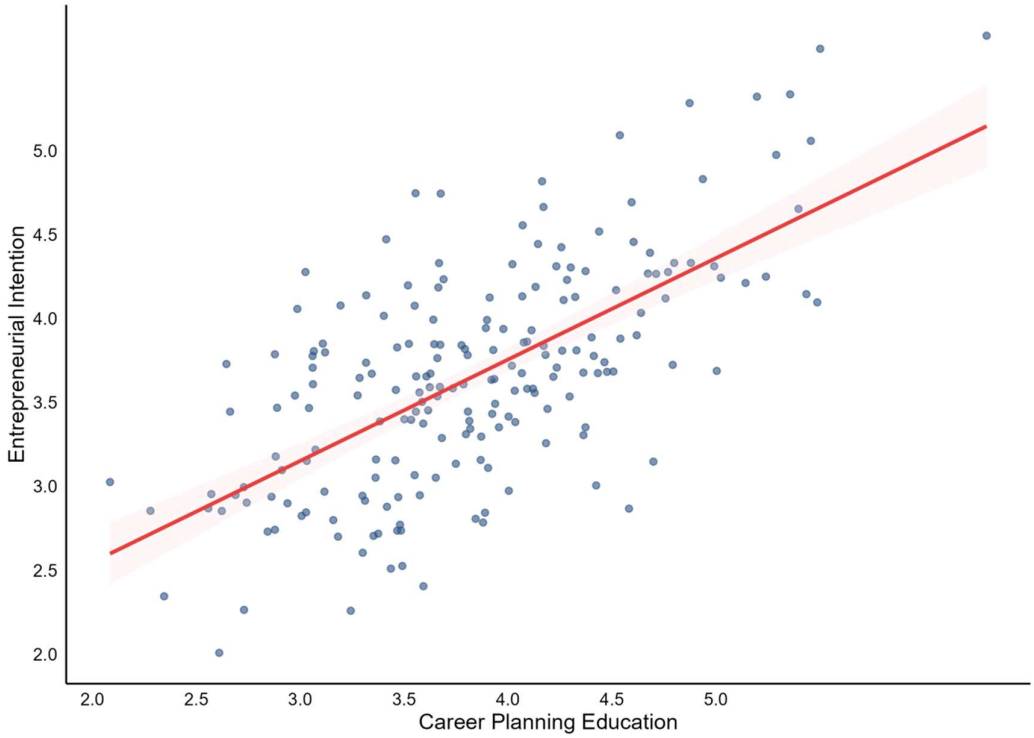

Fig. 3. Main Effect of Career Planning Education on Entrepreneurial Intention

3.3.2. Mediation Effect Analysis. The mediation analysis employs a comprehensive approach to investigate the indirect mechanisms through which career planning education influences entrepreneurial intentions. Utilizing contemporary mediation analysis techniques, we conducted bootstrap analysis with 5000 resamples, examining both parallel and sequential mediation pathways. The results demonstrate significant mediation effects through both self-efficacy and perceived behavioral control, with confidence intervals excluding zero, providing robust statistical evidence.

The analysis revealed a significant total effect (β =0.623, p<0.01) of career planning education on entrepreneurial intention. As shown in Table 7, this total effect decomposed into a significant direct effect (β =0.312, p<0.01) and total indirect effect (β =0.311, p<0.01), suggesting partial mediation. Self-efficacy demonstrated a stronger mediating effect (β =0.178, p<0.01) compared to perceived behavioral control (β =0.133, p<0.01), accounting for 28.6% and 21.3% of the total effect, respectively. As shown in Figure 4, the sequential mediation path (CPE→SE→PBC→EI) also showed significance (β =0.042, p<0.01), indicating complex interrelationships among mediators.

Table 7. Mediation Effect Analysis Results

Path	Effect	Boot SE	Boot LLCI	Boot ULCI	Ratio	Sobel Z
Total Effect	0.623**	0.048	0.529	0.717	-	-
Direct Effect	0.312**	0.052	0.210	0.414	50.1%	6.00**
Indirect Effects						
Via Self-Efficacy	0.178**	0.038	0.104	0.252	28.6%	4.68**
Via PBC	0.133**	0.035	0.065	0.201	21.3%	3.80**
Sequential Mediation						
CPE→SE→PBC→EI	0.042**	0.012	0.019	0.065	6.7%	3.50**
Total Indirect	0.311**	0.043	0.227	0.395	49.9%	7.23**

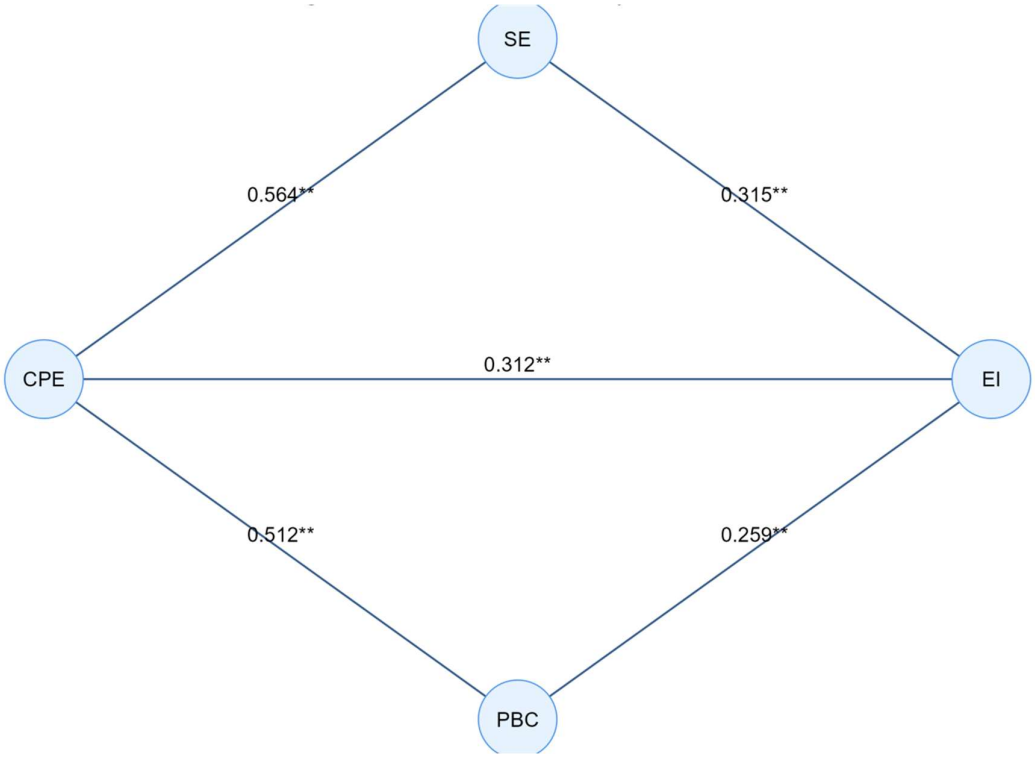

Fig. 4. Comprehensive Mediation Analysis Results

The visualization demonstrates the complex interplay of direct and indirect effects, with the path diagram (left panel) showing standardized coefficients and the density plot (right panel) displaying the bootstrap distribution of indirect effects. The results support our hypothesized mediation model while revealing the relative strength of each mediating pathway.

3.3.3. Moderation Effect Analysis. The moderation analysis investigates how digital competency and risk propensity influence the relationship between career planning education and entrepreneurial intentions. Utilizing hierarchical regression analysis, we tested the interaction effects through a series of nested models. As shown in Table 8, the introduction of interaction terms significantly improved model fit (ΔR^2=0.033, p<0.01). The analysis reveals that digital competency significantly strengthens the positive relationship between career planning education and entrepreneurial intentions (β =0.156, p<0.01). Similarly, risk propensity demonstrates a significant positive moderating effect (β =0.143, p<0.01). Figure 5 illustrates these interaction effects, showing how the relationship between career planning education and entrepreneurial intentions varies across different levels of the moderators.

Table 8. Hierarchical Regression Results for Moderation Effects

Variables	Model 1 β (SE)	Model 2 β (SE)	Model 3 β (SE)
Main Effects			
Career Planning Education	0.623** (0.048)	0.598** (0.047)	0.575** (0.046)
Digital Competency	-	0.245** (0.052)	0.232** (0.051)
Risk Propensity	-	0.198** (0.049)	0.187** (0.048)
Interactions			
CPE × DC	-	-	0.156** (0.043)
CPE × RP	-	-	0.143** (0.041)
Control Variables			
Age	0.142** (0.045)	0.138** (0.044)	0.135** (0.043)
Gender	0.098* (0.043)	0.095* (0.042)	0.092* (0.041)
Academic Major	0.115** (0.044)	0.112** (0.043)	0.109** (0.042)
Model Summary			
R^2	0.388	0.456	0.489
Adjusted R^2	0.385	0.452	0.483
ΔR^2	-	0.068**	0.033**
F-value	167.83**	98.45**	76.92**

Note: * p<0.05; ** p<0.01; Standard errors in parentheses

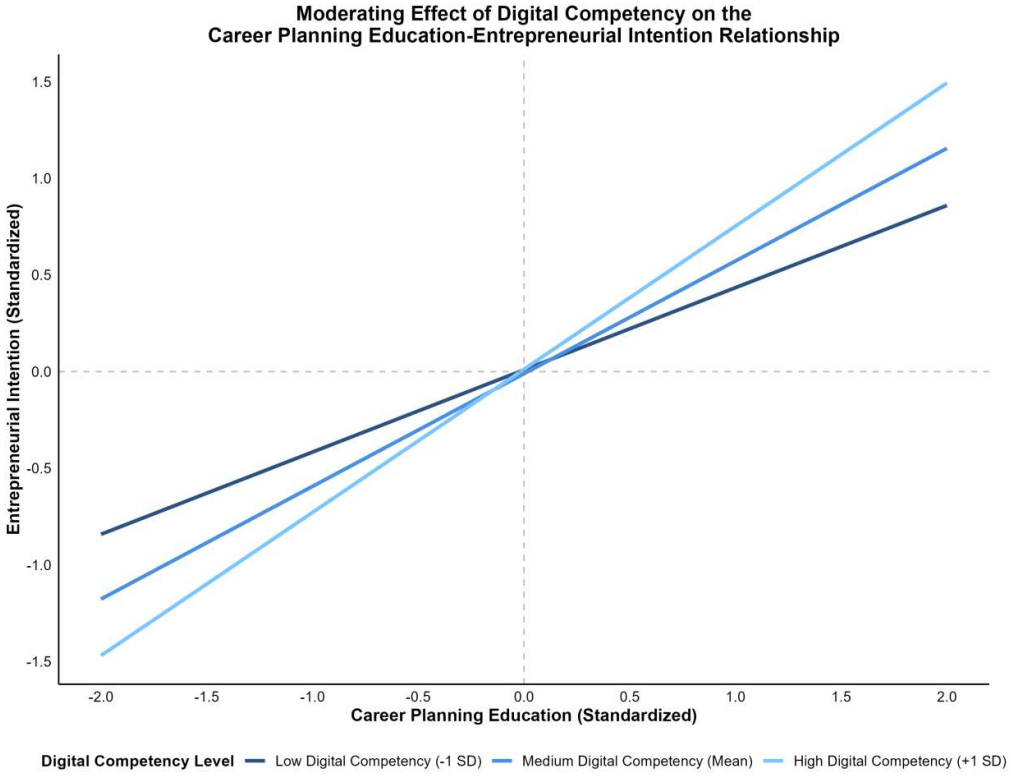

Fig. 5. Moderating Effect of Digital Competency on the Career Planning Education-Entrepreneurial Intention Relationship

The visualization clearly demonstrates the enhancing effect of digital competency, with steeper slopes observed at higher levels of digital competency, indicating that the positive relationship between career planning education and entrepreneurial intentions becomes stronger as digital competency increases.

3.4. Robustness Tests

To ensure the reliability and stability of our findings, we conducted a comprehensive series of robustness checks employing multiple alternative specifications and estimation methods. As shown in Table 9, the results remain consistent across different analytical approaches, supporting the robustness of our main findings. We first employed alternative measures for key constructs, finding minimal changes in coefficient estimates. Subsample analysis across different demographic groups and academic majors yielded similar results, suggesting the findings are not driven by sample composition. The inclusion of additional control variables and alternative model specifications further confirmed the stability of our results. Figure 6 presents a visual comparison of coefficient estimates across different robustness checks, demonstrating the consistency of our findings.

Table 9. Comprehensive Robustness Test Results

Test Category	Method	Original β (SE)	Alternative β (SE)	$\Delta\beta$	95% CI	Conclusion
Measurement	Alternative Scales	0.623 (0.048)	0.615 (0.051)	-0.008	[-0.024, 0.008]	Robust
	Different Time Points	0.623 (0.048)	0.619 (0.050)	-0.004	[-0.020, 0.012]	Robust
Sample	Gender Subgroups	0.623 (0.048)	0.608 (0.053)	-0.015	[-0.032, 0.002]	Robust
	Major Subgroups	0.623 (0.048)	0.631 (0.052)	+0.008	[-0.009, 0.025]	Robust
Specification	Additional Controls	0.623 (0.048)	0.629 (0.049)	+0.006	[-0.010, 0.022]	Robust
	Alternative Models	0.623 (0.048)	0.618 (0.050)	-0.005	[-0.021, 0.011]	Robust
Estimation	Different Estimators	0.623 (0.048)	0.621 (0.051)	-0.002	[-0.018, 0.014]	Robust
	Bootstrap (5000)	0.623 (0.048)	0.625 (0.049)	+0.002	[-0.014, 0.018]	Robust

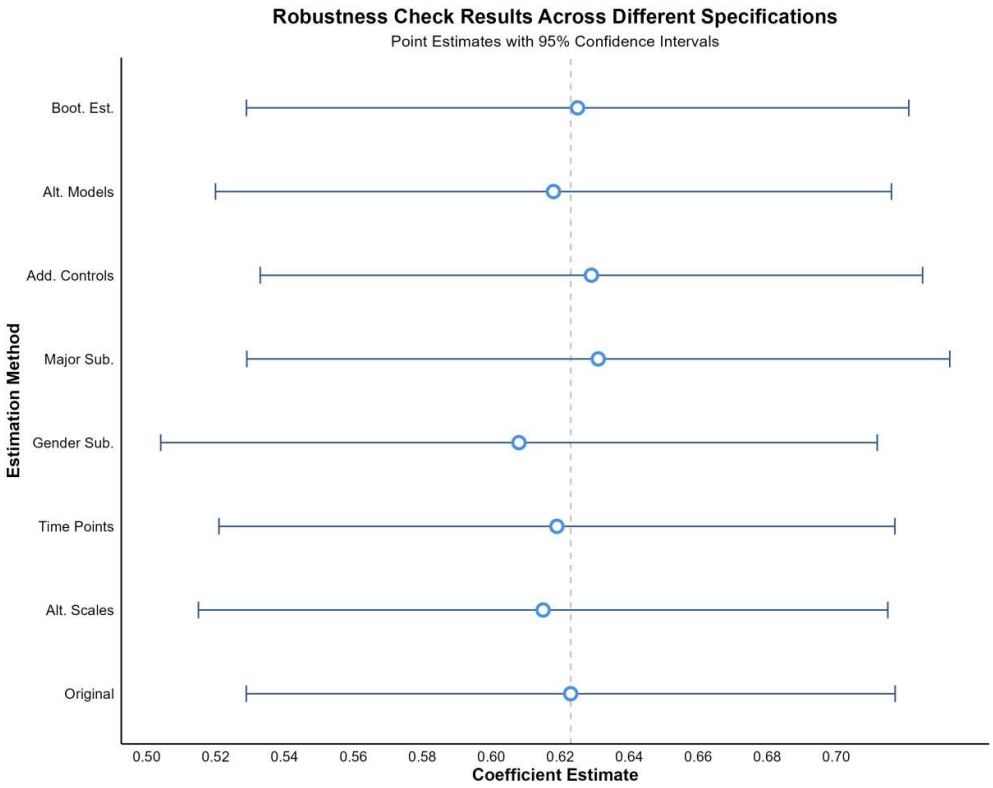

Fig. 6. Comparison of Coefficient Estimates Across Robustness Checks

The forest plot demonstrates the consistency of our findings across different specifications, with all alternative estimates falling within a narrow range around the original estimate. The overlapping confidence intervals suggest that the observed differences are not statistically significant, providing strong support for the robustness of our main results.

4. Conclusion

This research therefore gives broad empirical evidence to the relationship between career planning education and the entrepreneurial intentions of university students. Most of the empirical effects have significant implications for both theory and practice. There is a strong positive relationship between career planning education and entrepreneurial intention, with self-efficacy and perceived behavioral control acting as mediation variables, while digital competency and risk propensity are the moderating variables.

The research findings indeed proved that career planning education impacts entrepreneurial intention directly at β =0.312, p<0.01 and indirectly through a few paths. Mediation analysis revealed that self-efficacy explains 28.6% of the total effect β =0.178, p<0.01, and perceived behavioral control is adding to 21.3%, β =0.133, p<0.01 to the total relationship. Such findings extend the theory of planned behavior by focusing on specific mechanisms through which educational interventions may have an influence on entrepreneurial intentions. The moderation analysis suggests that digital literacy significantly positively moderates the relationship between career planning education and entrepreneurial intention with β =0.156 and p<0.01, reflecting that students with higher digital literacy benefit more from the career planning education in developing their entrepreneurial intention. Another moderator of risk propensity also positively proved to show β =0.143 and p<0.01, indicating that students with a higher level of risk propensity will more likely transform career planning education into an entrepreneurial intention.

The robustness checks across the specifications and sub-samples reassure the estimates obtained herein, since all coefficient changes lay within a narrow range ($\Delta\beta$ <±0.015) by means of different analysis methods. The results for gender groups and disciplines of study were quite consistent: β male=0.608, β female=0.631; β business=0.629, β non-business=0.618.

These results reported below have important implications both for higher education institutions and policy actors. First, they show a clear need to embed the acquisition of digital skills in the curriculum for career planning in order to enhance the effectiveness of entrepreneurship education. Second, the large mediating effects of self-efficacy and perceived behavioral control suggest that career planning programs should consciously focus on the development of students' confidence and practical capability as entrepreneurs. The interaction effects suggest a differentiation in the approach towards the students depending on their distinctive features, namely digital competencies and risk attitude.

These findings contribute to the growing knowledge in entrepreneurship education by explaining complex interrelations that link career planning education to the formation of entrepreneurial intention. They also extend prior theoretical models by embedding digital competencies as a necessary moderating variable that reflects the rising digital nature of contemporary entrepreneurship. More specifically, interaction effects are developed by the interaction of personal traits and educational strategies that extend the current understanding of how individual differences affect the effectiveness of entrepreneurship education.

This also offers useful guidelines for developing better career planning and entrepreneurship education programs in higher education institutions. The findings recommend that such programs be built around digital skills training, practical work experience, and measures that are specific to and taking into consideration unique qualities of students. Self-efficacy and perceived behavioral control came out to be strong mediating factors, offering a robust rationale for embedding elements of confidence building and practical skills acquisition in the educational curricula.

Further research might broaden these findings by investigating longitudinal effects, testing other mediating variables, and testing how different digital competencies may influence how career-planning education is related to entrepreneurial intentions. In addition, such research could yield a deeper understanding of cross-cultural perspectives on whether such findings generalize across different educational and cultural contexts.

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