Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9 No. 5, 915-929
2025
Publisher: Learning Gate
DOI: 10.55214/25768484.v9i5.7041

The impact of human capital on college students' employment outcomes: The mediating role of students' perceived employability

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Abstract: This study explores the impact of human capital on college students' employment outcomes in Shanxi Province, China, with a focus on the mediating role of perceived employability. Based on Human Capital Theory and Social Cognitive Career Theory, a structural equation model was used to analyze data from 750 valid questionnaires. Findings reveal that human capital, encompassing academic performance, skills, and work experience, significantly and positively affects both perceived employability and employment outcomes. Perceived employability not only directly influences employment outcomes but also mediates the relationship between human capital and employment outcomes, with a partial mediating effect confirmed by empirical tests. The study enriches theoretical perspectives on the interplay between human capital, perceived employability, and employment outcomes. Practical implications include recommendations for colleges to enhance students' employability through targeted curriculum design, practical training, and career guidance programs. This research provides valuable insights for policymakers and educators aiming to address regional disparities and optimize talent development strategies in transitional economies.

Keywords: *College students, Employment outcomes, Human capital, Mediating role, Perceived employability.*

1. Introduction

With the popularization of higher education in China and the increase in college enrollment, the number of college graduates has surged dramatically [1]. The number of college graduates increased from 2.12 million in the first year after expansion (2003) to a record high of 11.79 million in 2024. In 2023, the number of college graduates in Shanxi Province was 282,000, and it exceeded 290,000 in 2024. Against the backdrop of mass higher education, the supply-demand contradiction for college graduates in China has become increasingly prominent. The structural mismatch between employment and recruitment difficulties highlights the mismatch between the structure of higher education and the demand for talent in economic and social development [2]. Employment pressure has increased, making the issue of college graduate employment a focal point of widespread concern across society.

In May 2024, Zhiliang Recruitment released the Employment Research Report of 2024 College Graduates, the employment rate of 2024 graduates dropped to 55.5% from 57.6% in 2023.The proportion of slow employment and freelancing among 2024 graduates increased from 18.9% and 13.2% last year to 19.1% and 13.7% this year, respectively. The 2024 graduates' The employment situation is still not optimistic. Relevant research and survey results show that, in addition to external influences such as the general market environment, the top-level design at the national level and the recruitment demand of enterprises and institutions, the lack of employability of college students themselves and their inability to cope with the market test are also one of the internal influences affecting the employment of college students at present, and how to improve the employability of college students is a major problem that colleges need to be solved urgently at present [3].

History: Received: 10 February 2025; Revised: 29 April 2025; Accepted: 1 May 2025; Published: 10 May 2025
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As a central province of China, Shanxi Province has a strong demand for high-quality talents during the critical period of economic transformation and development, and at the same time faces problems such as the mismatch between the employment structure of college students and industrial demand. The employment situation of college students is not only related to individual career development and quality of life, but also affects the sustainable development of regional economy and social stability and harmony.

In the field of college students' employment research, the relationship between human capital, perceived employability and employment outcomes has attracted much attention. With the popularization of higher education, the issue of college students' employment has become the focus of society, and an in-depth exploration of the relationship between these variables is of great significance for improving the quality of college students' employment, optimizing college career guidance and improving employment policies.

There have been a lot of results on the influence of human capital on college students' employment. Through the analysis of a large number of questionnaire survey data, it is found that human capital has a significant impact on the employment intention of college students at the grassroots level, and students with excellent learning and practical ability have a stronger intention to go to the grassroots level for employment [4]. A study based on data from the National College Graduates Employment Survey pointed out that human capital significantly affects the employment quality of college graduates [5]. Other studies have used quantitative analysis to show that human capital is positively related to the employment quality of college students from economically disadvantaged families [6]. These studies reveal the important role of human capital in college students' employment from different perspectives. Knowledge of employability, as a subjective perception of college students' own employability, affects their job-seeking behavior and employment decisions. Some studies have indirectly shown that students with higher human capital tend to have higher perceived employability, which in turn gives them an advantage in the job market. In terms of employment outcomes research, scholars have explored multiple dimensions. Human capital affects subjective employment quality through the mediating role of employability [7] and other scholars construct an employment quality evaluation system with different college graduates as the research object to analyze the problems of employment and put forward enhancement strategies [8, 9].

Existing studies have achieved some results in the relationship between human capital, college students' perceived employability and employment outcomes, but there are still some shortcomings. First of all, most of the studies are concentrated in economically developed regions, and there are fewer studies on central regions like Shanxi Province, which lack regional specificity. At present, Shanxi Province is in a critical period of economic transformation, the industrial structure is constantly adjusting and upgrading, and the demand for various types of professionals has also changed significantly. In this context, the employment of college students in Shanxi Province faces new opportunities and challenges. Secondly, when studying the relationship between variables, the mediating role of perceived employability is less considered, failing to comprehensively reveal the internal mechanism between variables. In addition, there are certain limitations in the sample size and research methodology of existing studies, with some studies having small sample sizes and the generalizability of the research results to be improved. This study aims to make up for these shortcomings and takes college students in Shanxi Province as the research object to explore the relationship between human capital, perceived employability and employment outcomes in depth, so as to provide new perspectives and empirical evidence for the study of college students' employment problems.

Based on the above research, this study asks the following specific research questions:

1. What does the human capital impact the employment outcomes of college students in Shanxi Province?

2. What does the human capital impact the perceived employability of college students in Shanxi Province?

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 915-929, 2025
DOI: 10.55214/25768484.v9i5.7041

3. What does the students' perceived employability impact the employment outcomes?

4. What does students' perceived employability mediate the relationship between the human capital and the students' employment outcomes?

2. Literature Review

2.1. Definition of Human Capital, Perceived Employability and Employment Outcomes

For the college students, human capital factors refer to the internal factors of themselves, it is consisting of the graduate's academic performance, their skills, and their work experience [10, 11].

Perceived employability means an individual's view of their odds of getting and keeping a job [12]. In higher education research, it's very important. Students' self-perception in this area affects their decisions about studies and careers [13]. We see perceived employability as students' beliefs about their success chances in the labor market [14]. It influences students' efforts to improve skills for future jobs.

The result refers to the final state of things at a certain stage of development, this study defines the employment outcomes of college students as the personal employment characteristics of full-time employment of college graduates, including the acquisition of employment opportunities, the characteristics of job positions, subjective satisfaction and so on [15].

2.2. Human Capital Theory

The human capital theory was first introduced in the 1960s by American economists Schultz [16] and Becker [17]. Different from traditional economic theories that only regarded capital as physical capital, this theory expanded the concept. Schultz [16] proposed that human capital includes the overall knowledge, skills, and health within individuals. He emphasized that it could be invested in and had the potential to yield returns. According to him, human capital is a key factor in economic growth. The knowledge and skills obtained through investments in education, training, and healthcare can greatly improve labor productivity, and the return on these investments is much higher than that of physical capital.

Becker [17] applied the microeconomic analysis framework to the study of human capital. He believed that human capital investment is a rational choice made by individuals, following the principle of maximizing cost-benefit. Unlike Schultz's macro-level view, Becker explained how investments in education, training, and health influence income distribution and economic growth by increasing individual productivity.

Human capital can be understood as the knowledge, skills, and abilities an individual accumulates through education, training, and work experience. Education is a major form of human capital investment. Through education, people can gain knowledge, skills, and values, which enhances their productive ability and employability. Training helps individuals update their knowledge and skills to meet changing job requirements. Work experience, a key part of human capital, is the knowledge, job-related skills, and professional judgment that individuals obtain from practical work.

The influence of human capital factors on college students' employment outcomes is an important topic in the fields of education and academia. Additionally, college students' subjective perception of their own employability, known as perceived employability, is crucial in the job-seeking process. It affects students' confidence and actions during job hunting and may act as a mediator or moderator between human capital and actual employment outcomes. In-depth research on these variables is of great practical significance for improving the employment quality of college students and optimizing the talent-cultivation models in higher education institutions.

2.3. Social Cognitive Career Theory (SCCT)

Social Cognitive Career Theory (SCCT) was proposed by Lent, et al. [18]. The social cognitive career theory (SCCT), based on Bandura's General Social Cognitive Theory.

The theory emphasizes the significant role of individual self-efficacy in the process of career choice and development. Self-efficacy is an individual's subjective judgment and belief about their ability to

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successfully complete a task. In the context of college students' employment, perceived employability can be seen as a form of self-efficacy related to employment. According to the SCCT theory, the accumulation of human capital among college students influences their self-efficacy, which in turn affects their career choices and job-seeking behaviors. For example, college students with rich professional skills and practical experience often have greater confidence in their employability and are more willing to actively pursue high-quality job opportunities.

Research shows that perceived employability affects an individual's career interests and behavior, and that perceived employability is a determinant of an individual's ability to find a job. This theory has introduced many cognitive personality variables related to the individual and environmental factors affecting an individual's career development. For this reason, some authors [19, 20] emphasized that both individual and contextual factors must be considered to understand perceived employability.

2.4. Empirical Review

In recent years, scholars have used a variety of empirical methods to study the relationship between human capital and employment outcomes. In terms of research methods, they mainly include questionnaire survey method, interview method and data analysis method such as regression analysis and structural equation model. In recent years, scholars both domestically and internationally have conducted extensive research on the relationship between human capital and employment outcomes using various empirical methods. In terms of research methods, these primarily include questionnaire surveys, interviews, and data analysis techniques such as regression analysis and structural equation modeling. Studies have found that human capital significantly influences college students' employment intentions and has a substantial impact on the quality of their employment [5, 6]. Some studies have focused on the impact of internships on employability and outcomes [21]. Specifically, internship experiences related to one's major [22] or moderate internship duration [23, 24] can enhance the formation of employability, thereby improving the employment outcomes of college graduates. Other studies suggest that human capital acquired through higher education plays a positive mediating and negative moderating role in the employment process [25]. These findings indicate that human capital plays a crucial role in college students' employment choices and the improvement of employment quality.

Broad and solid basic knowledge has a significant impact on college students' employability and employment confidence. Although there are few studies directly studying the relationship between perceived employability and human capital and employment outcomes, it is very important in the process of employment. A study that combined the human capital theory and self-determination theory, through a survey of 430 final-year fine arts students in Guangxi, China, indicated that human capital have a positive impact on students' perceived employability [26]. Although Marginson [27] cast doubt on the explanatory power of the human capital theory, the positive connection between human capital and perceived employability has been further verified by empirical evidence from Berntson, et al. [28]; Donald, et al. [29] and Smith [30]. A study of 146 science and technology college graduates demonstrated that human capital has a positive influence on both employability and innovative work behavior, with employability acting as a mediator [31]. Among 1000 Chinese college students, a study by Zhang, et al. [1] found that academic performance and internship duration, as human capital indicators, are positively associated with employability. Studies have indirectly shown that students with higher levels of human capital also perceive higher employability. Batel [32] pointed out that college students face issues such as weak practical skills in their employability, and improving these skills can enhance students' awareness of their own employability. Zhao [33] found that various dimensions of human capital positively influence college students' career intentions, and students' perception of their own abilities may play a certain role in this process. It can be inferred that perceived employability is associated with the impact of human capital on career choices.

The relationship between perceived employability and employment outcomes is of utmost importance as it significantly affects an individual's employment success. Perceived employability,

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ISSN: 2576-8484
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referring to one's belief and confidence in securing suitable employment, is shaped by factors like qualifications, skills, experience, self-confidence, and labor market demand. Martini, et al. [34] explored the link between postgraduate students' perceived employability and their subsequent career success, along with personal and contextual factors influencing employability perceptions. Data from two-wave surveys of senior students at the college of Milan-Bicocca between 2021 and 2022 showed that perceived employability can predict graduates' objective and subjective career outcomes. Singh [35] based on the Graduate Capital Model (GCM) studied how international students in China participated in employability-related programs to enhance their home-country employment outcomes. Through in-depth interviews with 30 international students, it was found that those at elite Chinese colleges built and enhanced employability via various forms of capital, and actively used strategies to achieve successful employment, indicating a relationship between employability and employment outcomes, with employability mediating between human capital and employment outcomes. Dong and Bi [36] explored the influence of "three-dimensional capital" on the employment quality of students in private colleges, and found that human capital had a positive impact on the employment quality of college students in private colleges.

Based on the above literature, human capital is closely related to employment outcomes and plays a significant role in aspects such as job selection and employment quality. Although research on perceived employability needs further development, its impact during the employment process cannot be overlooked, possibly serving as a mediator or moderator between human capital and employment outcomes. Existing studies have laid the groundwork for subsequent explorations into the relationships among these three factors. Based on theoretical analysis and existing research findings, this study proposes the following hypotheses:

H1: There is a significant relationship between human capital and employment outcomes of college students.

H2: There is a significant relationship between human capital and perceived employability of college students.

H3: There is a significant relationship between college students' perceived employability and employment outcomes.

H4: College students' perceived employability plays a mediating role between human capital and employment outcomes.

3. Methodology

3.1. Conceptual Framework

The conceptual framework of this study is shown in Figure 1. The independent variable is college students' human capital (HC), including three dimensions: academic performance, skills and work experience; the mediating variable is college students' perceived employability (SPE); and the dependent variable is college students' employment outcomes (SEO).

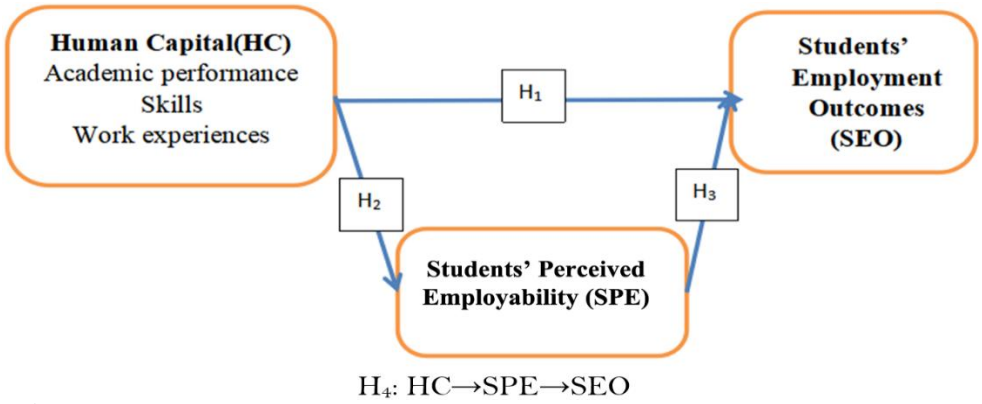

Figure 1.
Conceptual Framework

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 915-929, 2025
DOI: 10.55214/25768484.v9i5.7041

3.2. Sampling

This study aims to propose a quantitative method for testing the relationships between constructs in the employment outcome model of college students in Shanxi Province. The research design involved an online survey conducted using Wenjuanxing to collect data. The number of graduates from colleges in Shanxi Province is 290 thousand in 2024. Students from 10 colleges were selected as representatives of the study population, and the survey was carried out from October to December 2024. A total of 904 questionnaires were distributed, with 750 valid responses collected.

3.3. Instrument

The questionnaire for this study was designed on the basis of determining the variable measurement methods. The questionnaire was divided into three parts: the first part was basic information, the second part was questions related to college students' human capital, covering academic performance, skills and work experience, and the third part was questions related to college students' perceived employability and employment outcomes. In the process of questionnaire design, due consideration was given to the reasonableness, conciseness and comprehensibility of the questions to ensure that the respondents were able to answer the questions accurately.

The first part of the basic information is set up to capture the demographic background factors that may affect college students' employability and employment outcomes. Gender differences may lead to differences in career choice preferences and access to employment opportunities; the admission batch of the college entrance examination reflects, to some extent, students' academic foundation and differences in institutional levels when they enter college, which in turn are related to their subsequent access to educational resources and employment competitiveness; the fields of study is helpful in exploring the employment performances of students with different professional knowledge systems; political status reflects students' ideological awareness and organizational involvement The political profile reflects students' ideological awareness and organizational participation, which may have an impact on their social networks and career paths; and the place of origin is related to students' growth environment, family resources, and regional job market differences, which provide basic background data for subsequent in-depth analyses.

The second part addresses questions on human capital design, with a total of 13 items that comprehensively cover multidimensional content. Academic performance is measured through the ranking of academic performance, the number of scholarships received and other questions, reflecting students' achievements and abilities in professional knowledge; skills-related questions, such as independent learning ability, foreign language proficiency, computer proficiency, the degree of mastery of professional knowledge and application of professional knowledge, etc., to assess students' comprehensive quality and professional skills; work experiences related to part-time jobs, internships, participation in scientific research projects, and serving as a student cadre, participating in Questions related to work experience such as part-time jobs, internships, participation in scientific research programs, as well as serving as student cadres and participating in on-campus and off-campus activities consider the accumulation of students' practical experience and the improvement of their comprehensive quality.

The third part of the questions on perceived employability and employment outcomes consisted of 8 and 7 items, respectively, and were measured from multiple perspectives. The questions on perceived employability focus on students' knowledge of their professional skills and knowledge, their understanding of employers' needs, their confidence in employment opportunities, and their judgment of the interface between education and employment, reflecting students' subjective evaluation of their own employability; while the questions on employment outcomes are centered on dimensions such as the difficulty in obtaining a job, job satisfaction (including salary, work environment, and fit with career goals, etc.), opportunities for career development, and job stability. The employment outcome questions are centered on the difficulty of job acquisition, job satisfaction (including salary, work environment,

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career goal compatibility, etc.), career development opportunities, and job stability, etc., to comprehensively measure the objective situation and subjective feelings of students' actual employment.

The second and third parts of the questionnaire were measured using a five-point Likert scale. The scale ranges from 1 to 5, representing "strongly disagree", "disagree", "neutral", "agree" and "strongly agree". Higher scores indicate higher levels of human capital, perceived employability and better employment outcomes for college students.

4. Results

4.1. Demographic Information

Table 1. presents the demographic data of 750 respondents, which is fundamental for exploring the relationships among human capital (independent variable), perceived employability (mediating variable), and college students' employment outcomes (dependent variable). In terms of gender, 52.5% of the respondents are male and 47.5% are female, suggesting a relatively balanced sample. Regarding college entrance examination admission batches, the distribution across various categories is fairly even, indicating diverse academic entry-points that may relate to initial human capital levels. The field of study shows that 58.4% of students are in Science and Engineering, which could imply different skill sets and human capital accumulations compared to those in Liberal Arts (27.1%) and Arts and Physical Education (14.5%). Politically, 69.7% are Communist Youth League members, 20.4% are Communist Party members, and 9.9% are the masses, potentially influencing access to resources and social networks related to human capital development. The place of origin, with 36.5% from rural areas, 34.7% from townships, and 28.8% from cities, may affect pre-college educational resources and thus human capital, as well as students' perceived employability and subsequent employment outcomes. Overall, these demographic factors provide crucial context for further analysis of the hypothesized relationships.

Table 1.
Demographic Information

Respondent Profile (n=750)					
Attributes	**Distribution**	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Gender	Male	394	52.5	52.5	52.5
	Female	356	47.5	47.5	100
College Entrance Examination Admission Batch	1A	156	20.8	20.8	14.1
	2B	148	19.7	19.7	40.5
	2A	152	20.3	20.3	60.8
	2B	155	20.7	20.7	81.5
	2C	139	18.5	18.5	100
Field of Study	Liberal Arts	203	27.1	27.1	27.1
	Science and Engineering	438	58.4	58.4	85.5
	Arts and Physical Education	109	14.5	14.5	100
Political Status	Communist Party Member	153	20.4	20.4	20.4
	Communist Youth League Member	523	69.7	69.7	90.1
	The Masses	74	9.9	9.9	100
Place of Origin	City	216	28.8	28.8	28.8
	Township	260	34.7	34.7	63.5
	Rural Area	274	36.5	36.5	100

4.2. Correlations of Variable

Table 2 shows the Pearson's correlation coefficient matrix containing three variables (SEO, HC, and SPE), and the main diagonal elements of the matrix are all 1, indicating the correlation coefficients between the variables themselves. The other off-diagonal elements are the correlation coefficients between the different variables, with values ranging from 0.481 to 0.591, indicating a moderate positive

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 915-929, 2025
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correlation between the variables, but not a high correlation (an absolute value greater than 0.7 is usually considered a high correlation and a relatively low risk of multicollinearity [37].

Table 2.
Pearson Correlation.

Variable	SEO	HC	SPE
SEO	1		
HC	0.489**	1	
SPE	0.591**	0.481**	1

Note: ** Correlation is significant at the 0.01 level (2-tailed).

4.3. Exploratory Factor Analysis and Confirmatory Factor Analysis

According to the model fit test results in Table 3, it can be seen that the CMIN/DF = 1.414, within the range of 1-3, and RMSEA = 0.025, in the excellent range <0.08. Additionally, the test results for IFI, TLI, CFI, etc., all reached above 0.9, indicating excellent levels. Therefore, the comprehensive analysis results indicate that the CFA model has good fit. This indirectly proves that the college student employment outcome scale has good structural validity.

Table 3.
Confirmatory Factor Model Fit

Model Fit Index	Optimal Standard Value	Statistical Value	Fit Situation
CMIN	——	508.752	——
DF	——	344	——
CMIN/DF	<3	1.479	Good
RMSEA	<0.08	0.025	Good
CFI	>0.9	0.988	Good
GFI	>0.9	0.956	Good
AGFI	>0.9	0.948	Good
NFI	>0.9	0.963	Good
IFI	>0.9	0.988	Good
TLI	>0.9	0.987	Good

Under the premise that the CFA model of the College Employment Outcome Scale has a good fit, the Average Variance Extracted (AVE) and Composite Reliability (CR) of each dimension of the scale were further examined, and the testing process calculated the standardized factor loadings of each measurement item on the corresponding dimension through the established CFA model, and then through the formulas for calculating AVE and CR, the convergent validity values of each dimension and the combined reliability values. According to the standard, the minimum AVE value should reach 0.5 and the minimum CR value should reach 0.7 in order to indicate good convergent validity and reliability.

According to the analysis results in Table 4-4, it can be seen that in this validity test of college students' employment outcome scale, the AVE value of each dimension reaches more than 0.5 and the CR value reaches more than 0.7, which comprehensively can indicate that all dimensions have good convergent validity and combined reliability.

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Table 4.
Convergent validity and reliability test.

Constructs		Items	Factor Loading	Cronbach's Alpha	Composite Reliability	AVE
HC	HC1		0.803	0.921	0.8344	0.6269
	HC2		0.772			
	HC3		0.8			
	HC1	HC11	0.851	0.897	0.9	0.6443
		HC12	0.76			
		HC13	0.738			
		HC14	0.747			
		HC15	0.904			
	HC2	HC21	0.881	0.871	0.8753	0.638
		HC22	0.734			
		HC23	0.793			
		HC24	0.78			
	HC3	HC31	0.844	0.879	0.8804	0.6482
		HC32	0.802			
		HC33	0.757			
		HC34	0.815			
SPE		SPE1	0.766	0.925	0.9253	0.6082
		SPE2	0.797			
		SPE3	0.745			
		SPE4	0.765			
		SPE5	0.791			
		SPE6	0.709			
		SPE7	0.795			
		SPE8	0.862			
SEO		SEO1	0.771	0.916	0.9167	0.6118
		SEO2	0.723			
		SEO3	0.843			
		SEO4	0.808			
		SEO5	0.758			
		SEO6	0.821			
		SEO7	0.744			

Note: HC=Human Capital, SPE=Students' Perceived Employability, SEO=students' Employment Outcomes.

Reliability analysis is the core component for measuring internal consistency and stability within research scales, and it is also a critical step in ensuring the quality of empirical research data. This study conducted reliability tests on each variable scale using the Cronbach's α coefficient. The results showed that the reliability coefficients for human capital (HC), student self-perception, SPE), and student employment outcomes (SEO) were significantly above the academic threshold of 0.7 [37] fully demonstrating the scientific design of the scale items and the reliability of the measurement results. This provides solid support for exploring the mechanism by which independent variable HC influences dependent variable SEO, and also strongly supports the mediating role of SPE.

The Average Variance Extraction (AVE) method proposed by Fornell and Larcker [38] was adopted, which is a method strictly recognized by the academic community to test the discriminant validity between variables [39].

This method stipulates that the square root of the AVE for each factor must exceed the correlation coefficients between paired variables, serving as a critical criterion for assessing discriminant validity. The test results are presented in Table 4-5, where the values at each variable's corresponding position denote the correlation coefficients with other variables, while the diagonal values represent the square roots of the AVE for each variable.

This specification is based on the methodological requirement of strictly comparing AVE square roots with inter-variable correlations, distinguishing validity assessment. Overall, the correlation

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coefficients between variables are generally lower than the AVE square roots on the diagonal. This indicates that these variables can relatively independently reflect different underlying constructs and have high discriminative power, thus strongly validating the validity and reliability of variable measurement in this study.

Table 5.
Discriminant validity.

variable	HC	SPE	SEO
HC	**0.7918**		
SPE	0.559	**0.7799**	
SEO	0.583	0.643	**0.7822**

4.4. Hypothesis Testing Results and Discussion

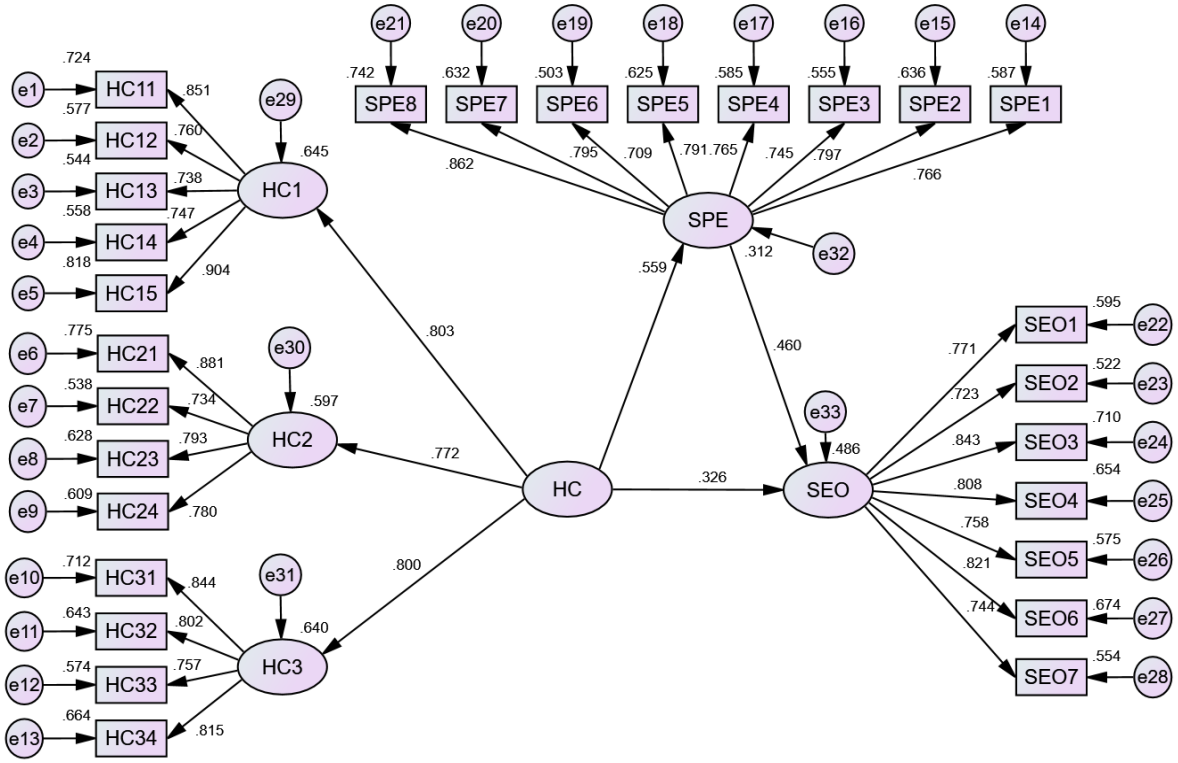

Figure 2.
Structural Model.

This study establishes four hypotheses, analyzed the literature based on the relevant literature search, set up the basic framework, and finally established the SEO structure equation, the study tested the hypothesis that each pathway affects SEO. Following the established hypothesis, there are 4 assumed pathways (H1-H4).

This research's hypothesis testing relies on the path analysis outcomes obtained from the final structural model in Structural Equation Modeling (SEM). To determine the significance level, the study adopts the following benchmarks: path estimates or regression weight estimates (path coefficients or regression coefficients), their corresponding Critical Ratio (CR > 1.96), and P-values at both the 0.05 and 0.001 thresholds [40, 41].

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ISSN: 2576-8484
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Table 6.
Results of the path test.

	Construct and Path	Estimate	S.E.	C.R.	P
H1	SEO<---HC	0.326	0.058	7.212	***
H2	SPE<---HC	0.559	0.057	11.92	***
H3	SEO<---SPE	0.46	0.047	10.497	***

Note: *** $p<0.01$.

Table 7.
Bootstrap method mediation effect test hypothesis results.

Pathway	Effect	Effect Value	Bias-corrected 95% CI		Outcome
			lower	Upper	
HC→SPE→SEO	Total Effect	0.583	0.517	0.643	partial mediation effect
	Direct Effect	0.326	0.243	0.404	
	Indirect Effect	0.257	0.209	0.317	

The study conducts a path test and a Bootstrap method effect test to explore the relationships among human capital (HC), perceived employability (SPE), and employment outcomes (SEO). As shown in Table 4-6, for hypothesis 1, the estimated value is 0.326, C.R. is 7.212, and $P < 0.01$, indicating a significant positive impact of HC on SEO. For hypothesis 2, the estimated value is 0.559, the C.R. is 11.92, and $P < 0.01$, suggesting that HC has a significant positive effect on SPE. For hypothesis 3, the estimated value is 0.46, the C.R. is 10.497, and $P < 0.01$, showing that SPE has a significant positive influence on SEO.

Further, Table 4-7 presents the Bootstrap method effect test results. For the pathway HC→SPE→SEO, the total effect value is 0.583 with a 95% bias-corrected confidence interval (CI) of [0.517, 0.643] , the direct effect is 0.326 (95% CI [0.243, 0.404]), and the indirect effect is 0.257 (95% CI [0.209, 0.317]). Since all effects are significant and the confidence interval of the indirect effect does not include 0, SPE plays a partial mediating role between HC and SEO.

In summary, these results validate the significant influencing paths among HC, SPE, and SEO, and confirm the partial mediating mechanism of SPE. The findings provide empirical support for understanding how human capital affects employment outcomes through perceived employability, enriching the theoretical framework of relevant research.

5. Conclusions and Implications

5.1. Finding

The purpose of this study is to investigate the impact of human capital on employment outcomes and the mediating role of perceived employability among college students in Shanxi Province. An extensive literature review was conducted to provide a solid foundation for this study. The relationships between the constructs are derived from studies in the literature. Based on strong literature support (theoretical and empirical), hypotheses were developed. In order to achieve the specific research objectives, the study conducted a rigorous empirical analysis of these hypotheses and came up with the following conclusions:

The three dimensions of human capital, namely academic performance, skills, and work experience, have a significant positive impact on the perceived employability and employment outcomes of Shanxi college students. Academic performance, as a visual representation of theoretical knowledge reserves, lays a solid knowledge foundation for college students' employment and enables them to better cope with the demands of the workplace at the theoretical level; skills are directly related to the operation and application ability in the actual work, which strengthens the practical competitiveness of college students in the job market; and work experience not only empowers students with the ability of adapting to the real world of work, but also accumulates valuable network resources and career knowledge for students. Work experience not only gives students the ability to adapt to actual work,

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 915-929, 2025
DOI: 10.55214/25768484.v9i5.7041

but also accumulates valuable human resources and career knowledge. colleges should attach great importance to the cultivation and enhancement of students' human capital, on the one hand, through optimizing the curriculum, strengthening professional teaching, consolidating students' professional knowledge; on the other hand, strengthening the practical teaching link, actively carrying out practical teaching activities, deepening the cooperation between colleges and enterprises, creating more internship opportunities for students and enhancing their practical skills. At the same time, students are encouraged to participate in various kinds of club activities and social practice to cultivate comprehensive quality. For students, they need to take the initiative to learn professional knowledge, actively obtain relevant skill certificates, accumulate practical experience, and comprehensively improve their human capital.

Perceived employability has a significant positive impact on college students' employment outcomes. It provides strong internal motivation and psychological support for college students' employment, and helps them stand out in the fierce competition for employment and obtain better employment outcomes. colleges should focus on strengthening the cultivation and guidance of college students' perceived employability. Special courses such as career awareness and self-assessment can be offered to help students understand their own abilities comprehensively and objectively and improve their perceived employability; they can also organize various kinds of employment practice activities and employment experience sharing sessions to enhance students' understanding of the job market, so as to enable them to continuously verify and improve their perceived employability in practice. College students themselves also need to pay attention to the development of their own abilities, actively participate in all kinds of learning and practical activities, continue to accumulate experience, correctly assess themselves, and make all-round preparations for future employment.

Students' perceived employability plays an important mediating role between human capital and employment outcomes. This suggests that in the process of improving students' employment quality, colleges should not only focus on cultivating students' academic performance, skills and providing internships to enhance human capital, but also pay attention to students' perception of their own employability, and guide students to correctly recognize their own abilities through career guidance courses and career planning counseling to strengthen their positive perception of their employability, so that they can better achieve employment. For students, they should make full use of school resources and strive to improve their human capital, while focusing on the improvement of their self-perception and positively adjusting their mindset in order to better cope with the challenges of the job market.

These conclusions provide an empirical basis for understanding the role mechanisms of factors in the employment process of college students, and also provide targeted practical directions for colleges and students.

5.2. Contribution

The theoretical contribution of this study lies in constructing and validating the chain mechanism of "human capital-perceived employability-employment outcomes." Based on human capital theory and occupational social cognition theory, it reveals that human capital has both direct effects on employment outcomes through knowledge and skills, and indirect effects through perceived employability. The findings show that the dimension of human capital not only directly improves employment quality but also indirectly promotes outcomes by enhancing individual confidence in employment, thereby complementing the critical role of subjective cognition in capability transformation, providing empirical evidence for future research.

The practical contribution of this study lies in the following three aspects. First, it provides strategies for employment guidance in colleges. colleges can develop more targeted employment guidance strategies based on the results of the study. Focusing on enhancing students' human capital, strengthening the teaching quality of professional courses, and providing practice and internship opportunities; in addition, for the intermediary role of students' perceived employability, strengthening the construction of employment guidance courses, helping students to correctly perceive their own

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 915-929, 2025
DOI: 10.55214/25768484.v9i5.7041

employability through simulated interviews, etc., and improving the effectiveness of employment guidance work. Secondly, it helps students' personal career planning. The results of the study provide important guidance for students to make career development plans. Students can clarify their competitive advantages and disadvantages according to their own situation, and carry out targeted self-improvement and career planning. For example, students with insufficient human capital can participate in extracurricular training and scientific research programs to correctly recognize their own employability and better achieve their employment goals. Third, it provides reference for the government and society to formulate employment policies. When the government formulates employment promotion policies for college students, it can increase investment in education resources, optimize allocation, and improve the quality of talent cultivation based on the impact of human capital on employment outcomes in the study; and encourage enterprises to provide internship and employment opportunities. The government and the society can jointly create a favorable employment environment and promote the rational allocation of human resources and the stable development of social economy.

5.3. Limitations and Suggestions for Future Research

This study has many limitations in analyzing the relationship between college students' human capital, perceived employability and employment outcomes.

First, the sample scope is limited. Taking college students in Shanxi Province as the sample, although it is valuable for the study of employment in a specific region, the geographical limitation of the sample is significant. The level of economic development and industrial structure of Shanxi differs greatly from that of developed regions in the east, and the resources of colleges, socialization opportunities for students are different in different regions, as well as the employment environment and students' concepts of employment, so it is difficult for the conclusions based on the sample in Shanxi to reflect the complex situation of college students' employment in different regions of the country, which restricts the generalizability of the results of the study.

Second, the research method is limited. The questionnaire method was mainly used, and the questionnaire has inherent flaws. Students are susceptible to social expectations and cognitive bias, making it difficult for the data to reflect the real situation. And the questionnaire has limitations in exploring the causal relationship of variables, and it is difficult to explore the deep mechanism.

In view of the limitations of this study in terms of sample scope, variable control and research methodology, future research can be improved in the following directions.

First, expand the scope of the sample to enhance the universality of the study: build a diversified sample system covering different regions and types of college students across the country. Study the employment status of college students in developed eastern regions, central, western and northeastern regions, and pay attention to the differences between different provinces. By comparing and analyzing the samples from different regions, we can accurately grasp the differences in the impact of human capital on college students' employment under different levels of economic development, industrial structures and cultural backgrounds, so as to make the results of the study more universal and provide powerful support for the formulation of national employment policies and talent cultivation plans for colleges.

Secondly, we innovate research methods to expand the depth and breadth of the study: break through the limitations of the questionnaire survey method and comprehensively utilize a variety of research methods. The interview method is used to explore the real experience and inner thoughts of students in the process of employment, providing theoretical support for quantitative research; the experimental research method is used to set up a simulated job-seeking scenario, manipulate the relevant variables, and explore the interaction between capitals in a specific scenario; the big data analysis technology is used to collect employment data from multiple channels, and analyze the employment behavior of college students and their influencing factors at both the macro-and microscopic levels, providing a rich and diversified data perspective and expanding the depth and

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 915-929, 2025
DOI: 10.55214/25768484.v9i5.7041

breadth of research. The data perspective is diversified, expanding the depth and breadth of the research.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 9, No. 5: 915-929, 2025
DOI: 10.55214/25768484.v9i5.7041