

<https://doi.org/10.70517/ijhsa464314>

A Random Forest-Based Model for Predicting the Mental Health Status of Innovative Entrepreneurs

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Abstract In order to scientifically assess the dynamic impact of artificial intelligence on the psychological health of college students' innovation and entrepreneurship, this paper selects the multidimensional data of college teachers and students' cognition of AI technology application, psychological health status, etc., and constructs a model of the impact mechanism. Due to the complex covariance of the variables affecting mental health, a multilayer recursive ridge regression method is introduced to improve the modeling stability. The correlation between AI and the dimensions of innovation and entrepreneurship mental health is analyzed, while its specific influence on innovation and entrepreneurship atmosphere and innovation and entrepreneurship mental health is mined. The study shows that with $P < 0.05$, there is a significant negative correlation between 5 dimensions of artificial intelligence and 10 dimensions of students' innovation and entrepreneurship mental health. In the regression analysis, AI affects innovation and entrepreneurship climate and mental health at the 0.05 level, and the explanatory rate of each dimension is greater than 0.400 and 0.500, respectively. Innovative entrepreneurial climate also indirectly improves the display mental health status at the 0.05 level.

Index Terms artificial intelligence technology, innovation and entrepreneurship mental health, complex covariance, multilevel stepwise ridge regression

I. Introduction

Innovative entrepreneurship is a high-risk activity that tests the psychological quality of entrepreneurs. And the psychological problems of entrepreneurs seriously affect the success rate and participation rate of entrepreneurship [1]. In addition, in the process of innovation and entrepreneurship, due to the lack of social experience, without sufficient psychological preparation, under the entrepreneurs' own practical ability and market awareness deviation is large, toughness is insufficient, lack of professionalism, can not effectively combine Internet information technology and practical entrepreneurship and other factors, it is easy to encounter setbacks and failures, feel confused and unconfident, and even demoralization, and even more devastating, to entrepreneurship The devastating blow to motivation reflects the importance of psychological tolerance [2]-[6]. The complex social environment of entrepreneurship and the cruel market competition will give entrepreneurs enormous psychological pressure, if the psychological pressure of entrepreneurship can not be effectively converted and channeled, it is very likely to cause a fatal blow to the original psychological immaturity of the entrepreneurs, and even jeopardize their overall mental health [7]-[9].

In today's rapidly developing era, Artificial Intelligence (AI) has become an important force for social progress and economic development, which not only changes our way of life, but also brings new opportunities and challenges for personal innovation and entrepreneurship. With the help of AI technology, various information related to innovation and entrepreneurship can be easily accessed to discover potential innovation and entrepreneurship opportunities. It can stimulate individual creativity and thinking, and reduce the threshold and cost of innovation and entrepreneurship. It breaks down the barriers between different disciplines and industries, enabling fields that originally seemed unrelated to each other to combine and generate new innovations [10]-[13]. In addition AI has a wide range of applications in psychological diagnosis, personalized psychotherapy, psychoeducation, and other mental health fields, providing convenient and effective psychological support for patients [14]-[16]. However, at present, there is no research that explores how AI affects the mental health of innovation and entrepreneurship.

Artificial intelligence technology provides a new path to improve the mental health status of college students. This paper sets the variables of artificial intelligence on innovation and entrepreneurship mental health and explores the specific influence mechanism through the statistical analysis of data related to the application of artificial intelligence technology and innovation and entrepreneurship mental health. By integrating ridge regression and multilayer

stepwise method, a multilayer stepwise ridge regression model is proposed to solve the problems of variable covariance and the dynamics of AI technology. Multiple covariates are suppressed by ridge regression to obtain stabilizing coefficients. Using the multilayer step structure, the coefficients and independent variables are reconstructed as time-varying parameter systems, realizing the dynamic modeling of influence variables.

II. Artificial Intelligence-based Research Methodology for Innovative Entrepreneurial Mental Health

II. A. Object and content of the study

II. A. 1) Subject of the study

In 2024, to investigate the basic situation of college students' employment in colleges and universities in Y province, mainly including the general situation, the cognitive status of innovation and entrepreneurship, the indicators of mental health in employment, the basic situation of the family, the situation of the school carrying out employment guidance, the intention of employment and entrepreneurial willingness, etc.; and to investigate the innovation and entrepreneurship management teachers of the colleges and universities, college students of different grades and college students who have already been employed.

II. A. 2) Content of the study

It mainly studies the current situation and problems of innovation, entrepreneurship and employment guidance in colleges and universities in Province Y; factors affecting the quality and ability of innovation, entrepreneurship and employment of college students; the curriculum and teaching content of teaching materials for innovation, entrepreneurship and employment guidance courses for college students; and the operation mechanism and platform construction of innovation, entrepreneurship and employment guidance in colleges and universities. The psychological health status of the current employment situation was also evaluated by using the symptom self-assessment scale and depression status scale.

II. B. Study design

II. B. 1) Data sources

The data used in this paper come from the Dynamic Survey (CLDS) organized and implemented by the University's Center for Social Science Research. The survey utilized a multi-stage, multi-level, sampling methodology in which the size of the university students was proportional to the size of the university. The target populations were innovation and entrepreneurship management teachers, college students of different grades, and employed college students in each university. The survey focuses on changes in the mental health of college students in innovation and entrepreneurship. In addition, the 2024 survey included a questionnaire specifically focused on the use of AI in innovation and entrepreneurship and career guidance in colleges and universities, which is in line with the objectives of this study. The empirical data used in this paper come only from the individual questionnaires in the 2024 dynamic survey. The sample selection process is as follows: according to the research objective, which focuses on how the use of AI affects the psychological health of university students in innovation and entrepreneurship, 800 students were screened as a sample for the study. Due to the lack of joint information in the sample, 50 observations had missing values and the final analyzed sample included 750 valid observations.

II. B. 2) Selection of variables

1) Dependent Variable.

The dependent variable is the innovative and entrepreneurial mental health of students in higher education, as characterized by their level of depression and whether they are depressed or not. The CLDS data measured the level of depression using the (CES-D) scale, where respondents were asked to report how often they experienced 25 different depressive symptoms in the past week. Response options were "never or almost never (<2 days), rarely (2-3 days), often (4-5 days), and almost always (6-7 days)," and these responses were assigned a score of 0.0, 1.0, and 2.0, respectively. Scores for each of the respondents' 25 depressive symptoms were calculated and each score was simply summed, with the total score serving as a proxy indicator of mental health. The indicator was scored on a scale of 0-50, with higher scores implying poorer mental health. In addition, the CES-D scale has been used in clinical practice with clearer cut-off values to determine whether the investigator is in a pathologically depressed state.

2) Independent Variables

The core independent variable is artificial intelligence, which is derived from a question in the CLDS questionnaire, "Whether college administrators utilize artificial intelligence technology (e.g., AI chat assistants, emotion recognition tools, etc.) to provide students with guidance on innovation and entrepreneurship mental health". If the answer is "yes", the variable is assigned a value of 1.0; if the answer is "no", it is assigned a value of 0.0.

3) Mediating Variables

The mediating variable is the innovation and entrepreneurship climate, which is an indicator of students' satisfaction with AI guidance. In this paper, we use five options, namely very dissatisfied, not too satisfied, neither satisfied nor dissatisfied, relatively satisfied, very satisfied, and the value of the option is 1-5, and the higher the value of this index, the better the innovation and entrepreneurship atmosphere is.

4) Control Variables

In addition, in order to prevent other important variables affecting students' innovation and entrepreneurship mental health from being omitted, this paper sets the following three types of control variables: individual characteristics, innovation and entrepreneurship characteristics and regional characteristics.

Individual characteristics. ① Age. Based on the age of the respondents at the time of the interview, only the sample of college students aged 18-25 is retained. ② Gender. A dummy variable was set to assign a value of 1.0 to males and 0.0 to females. ③ Employment status. The questionnaire categorizes the employment status of respondents into three categories: unemployed, employed, and ready to start a business, with unemployed and ready to start a business assigned a value of 0.0 and employed assigned a value of 1.0. ④ Household registration. Agricultural household registration is assigned as 0.0 and others as 1.0. ⑤ Educational attainment. Set dummy variables according to years of education. ⑥ Physical health. Classify respondents' physical health into five categories according to their physical health status: very unhealthy, relatively unhealthy, average, healthy, and very healthy, and set dummy variables 1-5 respectively.

Innovative entrepreneurial characteristics. ① Company type. According to the categorization in the questionnaire, it is divided into individual company and other, and set dummy variables. Assign the value of individual company as 1.0 and other as 0.0. ② Annual revenue. The pre-tax revenue in 2024 was taken as revenue income and logged. ③ Hours of work. Set a dummy variable based on whether the respondent's working hours are more than 8 hours, assigning overtime as 1.0 and 0.0 otherwise.

Regional characteristics. Given that mental health related to innovation and entrepreneurship is influenced by regional economic development, regional characteristics were also controlled. The regions were categorized into East and Midwest, assigning a value of 1.0 to the East and 0.0 to the Midwest.

II. B. 3) Model setup

The purpose of this paper is to explore the impact of applying AI in universities on students' innovative and entrepreneurial mental health, and to clarify the mediating role played by the innovative and entrepreneurial atmosphere in the process of AI's impact on mental health. To this end, the following model is established:

$$psyhealth_i = \alpha_0 + \beta_0 AI_i + \gamma_0 control_i + \varepsilon_i \quad (1)$$

$$Environment_i = \alpha_1 + \beta_1 AI_i + \gamma_1 control_i + \varepsilon_i \quad (2)$$

Equation (1) is used to test the impact of artificial intelligence on the mental health of college students' innovation and entrepreneurship. This paper uses equations (1) and (2) to test the "bridge role" of innovation and entrepreneurship in the impact of artificial intelligence on the mental health of college students. In the formula, the subscript i represents a single student, and $psyhealth_i$ represents the mental health of student i . $environment_i$ indicates student i 's satisfaction with his or her work environment, and AI_i is a dummy variable that indicates whether student i 's university uses AI technology. In addition, $control_i$ represents a matrix of control variables that includes variables related to individual characteristics, employment characteristics, and regional characteristics. Finally, α_0, α_1 are the intercept terms, and ε_i is the random perturbation terms.

II. C. Multi-Level Progressive Ridge Regression

The ridge regression analysis method can play a unique role in solving the problem of multiple covariance between the variables of the impact of artificial intelligence on the mental health of innovation and entrepreneurship. While the multilayer recursive order method can fully consider the time-varying characteristics of the variable analysis system, combining the ridge regression analysis and the multilayer recursive order method with each other to construct a dynamic model that is more accurate than the ridge regression model, which can not only solve the multiple covariance of the transformational system of the impact of AI on students' innovative and entrepreneurial mental health, but also can fully consider the dynamic time-varying characteristics of the system.

II. C. 1) Multi-layer stepwise approach

The operating environment of the transformation system of the impact of artificial intelligence on students' innovative and entrepreneurial mental health involves many factors, and these environmental factors tend to change continuously over time, and policy adjustment, technological updates, information access, market demand, etc.,

change at different times, so that the transformation system of the impact of artificial intelligence on students' innovative and entrepreneurial mental health exhibits the characteristics of time-varying system. Ridge regression method is a modeling method of constant system, if ridge regression method is used, the time-varying characteristics of the system can not be well reflected when modeling the transformation system of artificial intelligence impact on students' innovative entrepreneurial mental health, so a method applicable to the modeling of time-varying system is needed to study the transformation system of artificial intelligence impact on students' innovative entrepreneurial mental health.

This paper proposes the idea of multilayer recursive order, which is an adaptive identification method of model structure and parameters developed based on the traditional stochastic gradient algorithm. The method is based on the identification method of time-varying parameter model, which transforms the nonlinear model into a multilayer linear model in the sense of input-output equivalence, providing an effective method for modeling nonlinear time-varying systems. The mathematical model of the multilayer recursive method is:

$$Y(k) = \sum_{i=1}^m \beta_i(k) X_i(k) + \varepsilon(k) \tag{3}$$

where $Y(k)$ is the output variable, $X_i(k)$ is the independent variable, $\beta_i(k)$ is the time-varying parameter, m is the number of independent variables, and $\varepsilon(k)$ is the zero-mean white noise.

The recursive algorithm formula for calculating the time-varying parameters is:

$$\hat{\beta}_i(k) = \hat{\beta}_i(k-1) + \frac{X_i(k)}{\sum_{i=1}^m X_i^2(k)} \left[Y(k) - \sum_{i=1}^m X_i(k) \cdot \hat{\beta}_i(k-1) \right] \tag{4}$$

With the predicted values of the time-varying parameters $\hat{\beta}_i(k)$, the predicted output $\hat{y}(k)$ can be obtained according to equation (3):

$$\hat{y}(k) = \sum_{i=1}^m \hat{\beta}_i(k) X_i(k) \tag{5}$$

II. C. 2) Multi-Level Progressive Ridge Regression Method and Modeling Steps

In this paper, the ridge regression method is combined with the multilayer stepwise method to improve the formation of the multilayer stepwise ridge regression method, so that it can not only solve the multicollinearity problem between independent variables, but also fully consider the time-varying problem of the dynamic system. The specific method is as follows: firstly, the ridge regression coefficients of the respective variables are obtained by ridge regression analysis, and then the product of the ridge regression coefficients and their corresponding independent variables is regarded as the new independent variables, and then the time-varying parameters of the new independent variables are obtained by the multilayer stepwise method, so as to establish the multilayer stepwise ridge regression model.

The steps for modeling the multilayer recursive ridge regression method are as follows:

1) Standardization of data: the independent variable matrix X and the dependent variable Y are standardized according to equation (6), where Z is the sample data, μ and σ are the mean and standard deviation of Z , respectively, and Z^* is the standardized variable of Z .

$$Z^* = \frac{Z - \mu}{\sigma} \tag{6}$$

2) Calculate the ridge regression coefficient: Calculate the standardized ridge regression coefficient and get the standardized ridge regression model, and according to the formula (6) the standardized variables are reduced to the original variables can get the ridge regression method model:

$$Y(k) = a_0 + \sum_{i=1}^m a_i X_i(k) \tag{7}$$

where a_0 and a_i are the ridge regression coefficients.

3) Calculate the time-varying parameters: do the equivalent transformation to the model of ridge regression method, so that $Y'(k) = Y(k) - a_0$, $X'_i(k) = a_i X_i(k)$, according to the formula (3) can be obtained from the mathematical model of the new multi-layer recursive order method:

$$Y'(k) = \sum_{i=1}^m \beta'_i(k) X'_i(k) \tag{8}$$

Calculate the value of $\beta'_i(k)$ according to the number recursive algorithm of time-varying parameter in the multilayer recursive step method, then a series of time-varying parameter sequences $\{\beta'_i(k)\}$ can be obtained.

4) Establish the prediction model of multilayer recursive ridge regression method: analyze $\{\beta'_i(k)\}$, select the appropriate time-varying parameter prediction model, such as mean approximation, autoregressive method, etc., and obtain the predicted value of time-varying parameter $\hat{\beta}'_i(k)$. Bringing $\hat{\beta}'_i(k)$ into Eq. (8) has:

$$\hat{Y}'(k) = \sum_{i=1}^m \hat{\beta}'_i(k) X_i(k) \tag{9}$$

Then the prediction equation for the multilayer recursive ridge regression method is:

$$\hat{Y}(k) = a_0 + \sum_{i=1}^m a_i \hat{\beta}'_i(k) X_i(k) \tag{10}$$

III. Specific analysis of the impact of artificial intelligence on the field of mental health in innovation and entrepreneurship

III. A. Descriptive statistical analysis of variables

Table 1 shows the meanings of the main variables of the impact of AI on the mental health of innovation and entrepreneurship, as well as the corresponding descriptive statistics. In the descriptive statistical analysis of the selected dependent, independent, mediator, and control variables, the mean value is between 1.892-41.010, and the standard deviation ranges from [1.650,11.457], and the statistical results among the variables vary widely, which is in line with the requirements of regression analysis.

Table 1: The descriptive statistical analysis results of the variables

Variable	Variable description	Observed value	Average value	Standard deviation
Dependent variable				
Mental health	Total score of the interviewees is used as a proxy indicator of mental health	750	9.089	10.409
Core explanatory variable				
Artificial intelligence	Used artificial intelligence:1.0; otherwise:0.0	750	2.063	1.805
Mediating variable				
Atmosphere of innovation and entrepreneurship	Values are assigned based on the respondents' satisfaction with the atmosphere of innovation and entrepreneurship	750	5.185	2.153
Control variable: Individual characteristics				
Age	Select college students aged 18-25	750	41.010	11.457
Gender	Male 1.0; Female 0.0	750	2.341	1.865
Employment situation	Unemployed or preparing to start a business: 0.0; otherwise: 1.0	750	2.666	1.710
Household registration	Agricultural household registration: 0.0, otherwise: 1.0	750	2.117	1.830
Years of education	Take the years of education of the interviewees as the indicator	750	12.136	4.685

Good health	Take the physical health condition of the interviewees as the indicator	750	5.638	2.183
Control variable: Characteristics of innovation and entrepreneurship				
Company type	Individual company: 1.0 Otherwise: 0.0	750	1.892	1.650
Annual revenue	Revenue collection logarithm	750	11.334	4.733
Work overtime or not	Overtime: 1.0 Otherwise: 0.0	750	2.114	1.829
Control variable: Regional characteristics				
Region	Eastern region: 1.0 Otherwise: 0.0	750	2.209	1.857

III. B. The Relationship Between Artificial Intelligence and Mental Health in Innovation and Entrepreneurship

III. B. 1) Relevance of Dimensions of Artificial Intelligence Applications

The application of artificial intelligence in innovation and entrepreneurship mental health assistance in colleges and universities is mainly reflected in five dimensions, namely: artificial intelligence cognition, artificial intelligence decision-making, artificial intelligence interaction, artificial intelligence optimization, and artificial intelligence innovation. Pearson correlation analysis was conducted to analyze the dimensions of the current status of AI application of college administrators. Figure 1 shows the results of the correlation analysis. ** stands for $P < 0.05$, i.e., all five dimensions of AI application are significantly positively correlated at the level of 0.05 (all correlation coefficients are greater than 0.000). The higher the level of AI cognition of college administrators, the more they can make correct innovation and entrepreneurship guidance decisions and provide effective AI interaction, optimization, and innovation applications for students' innovation and entrepreneurship mental health, thus improving the innovation and entrepreneurship atmosphere on campus and improving students' mental health status before and after innovation and entrepreneurship.

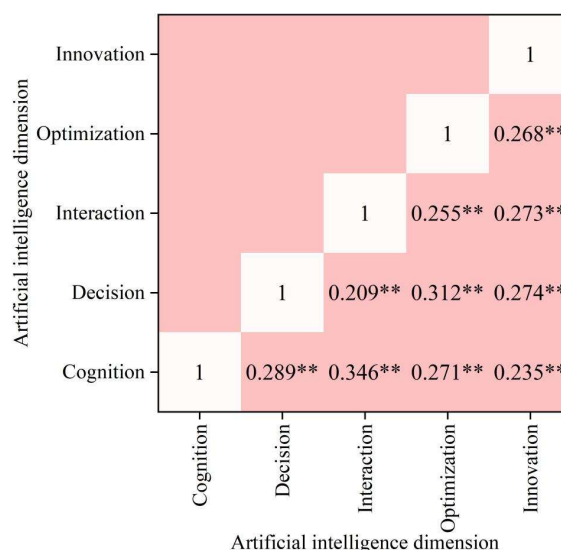


Figure 1: The correlation of various dimensions of artificial intelligence

III. B. 2) Correlation between AI and dimensions of mental health

The 10 dimensions of innovation and entrepreneurship mental health of college students include obsessive-compulsive symptoms, paranoia, hostility, interpersonal sensitivity, depression, anxiety, sense of learning pressure, maladaptation, emotional instability, and psychological imbalance. In order to determine exactly how AI applications can affect the innovation and entrepreneurship mental health of college students, a Pearson correlation analysis was conducted between the dimensions of the current status of AI applications and the dimensions of the innovation and entrepreneurship mental health of college students. Figure 2 shows the results of the correlation analysis

between the dimensions of artificial intelligence and mental health. Among them, the P of each dimension is less than 0.05, and the figure is not specially labeled for the convenience of presentation. The Pearson correlation coefficients between the five application dimensions of artificial intelligence and the 10 dimensions of innovation and entrepreneurship mental health are all less than 0.000, and $P < 0.05$, indicating that there is a significant negative correlation between the dimensions of artificial intelligence and the dimensions of students' innovation and entrepreneurship mental health at the level of 0.05. That is, the higher the level of artificial intelligence application, the lower the possibility of students' unhealthy psychological problems such as obsessive-compulsive symptoms, and the negative psychological state of students can be improved.

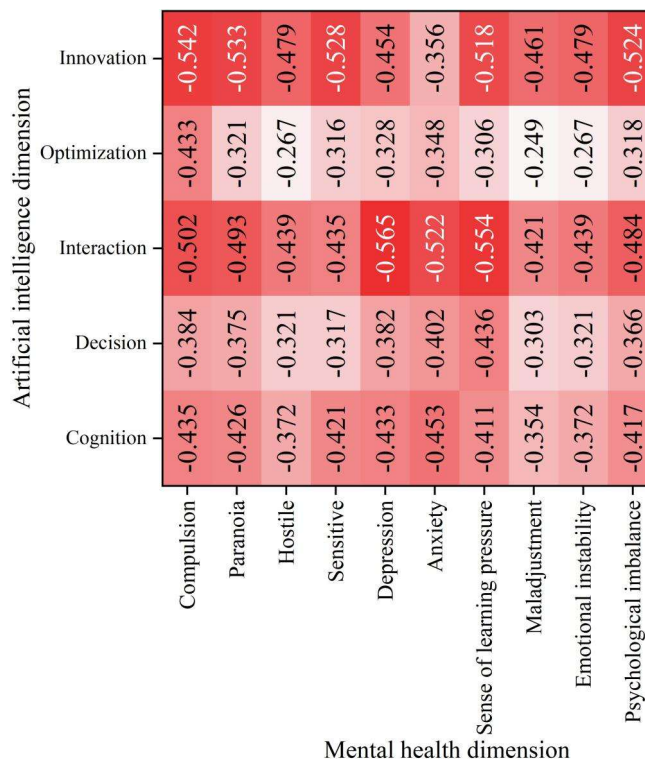


Figure 2: Correlation analysis results of each dimension

III. C. Multi-level stepwise ridge regression analysis

III. C. 1) Regression Analysis of Artificial Intelligence and Innovation and Entrepreneurship Climate

By establishing a variable model, we analyze how artificial intelligence affects the innovation and entrepreneurship atmosphere in colleges and universities as well as students' innovation and entrepreneurship mental health. Table 2 shows the regression analysis results of AI and innovation and entrepreneurship atmosphere in universities. Innovation and entrepreneurship atmosphere is experienced through four dimensions: institutional support of universities, teachers and guidance, platform and resources, culture and atmosphere. Artificial intelligence technology significantly affects the 3 dimensions of innovation and entrepreneurship atmosphere of university institutional support, platform and resources, and culture and atmosphere at the 0.05 level, and significantly affects the dimension of faculty and guidance at the 0.01 level. The explanation rate of artificial intelligence on each dimension reaches 0.402, 0.559, 0.441, 0.476 respectively, which are all more than 0.400. The utilization of artificial intelligence technology can improve the innovation and entrepreneurship atmosphere of universities, so that students can get more spiritual support and material support.

Table 2: Regression analysis of Artificial Intelligence and Atmosphere

Independent variable	Atmosphere of innovation and entrepreneurship			
	Institutional support	Teachers and Guidance	Platform and Resources	Culture and Atmosphere
Artificial intelligence	0.375**	0.421***	0.416**	0.447**
F	4.151**	13.742***	5.693**	3.175**
R2	0.402	0.559	0.441	0.476

Note: ** represents $P < 0.05$, *** represents $P < 0.01$, the same below.

III. C. 2) Regression Analysis of Artificial Intelligence and Innovative Entrepreneurial Mental Health

Table 3 shows the results of regression analysis of artificial intelligence and innovation and entrepreneurship mental health. The effects of artificial intelligence technology on all 10 dimensions of innovation and entrepreneurship mental health passed the significance test and alleviated students' psychological problems at the 0.05 level. The explanation rate of artificial intelligence on the psychological health of innovation and entrepreneurship reaches 0.501, 0.525, 0.519, 0.512, 0.507, 0.535, 0.542, 0.529, 0.567, 0.552, respectively, and the explanation rate is over 0.500, and the application of AI technology can assist students in more correctly identifying their own innovation and entrepreneurship process of the emergence of psychological emotional problems, so as to actively seek help and avoid the emergence of psychological crisis.

Table 3: Regression analysis of Artificial Intelligence and Mental Health

Independent variable	Mental health in innovation and entrepreneurship									
	Compulsion	Paranoia	Hostile	Sensitive	Depression	Anxiety	Learning pressure	Maladjustment	Emotional instability	Psychological imbalance
Artificial intelligence	-0.420**	-0.337**	-0.372**	-0.403**	-0.369**	-0.421**	-0.383**	-0.411**	-0.375**	-0.326**
F	3.202**	4.153**	2.621**	4.004**	2.057**	3.205**	4.026**	3.318**	2.981**	4.526**
R2	0.501	0.525	0.519	0.512	0.507	0.535	0.542	0.529	0.567	0.552

III. C. 3) Regression Analysis of Innovation and Entrepreneurship Climate and Innovation and Entrepreneurship Mental Health

The application of artificial intelligence technology can improve the campus innovation and entrepreneurship atmosphere, and the change of campus atmosphere should affect students' innovation and entrepreneurship mental health to a certain extent. In order to explore the actual situation in this regard, the same regression analysis was conducted on the mediating variable of innovation and entrepreneurship atmosphere and the dependent variable of innovation and entrepreneurship mental health. Table 4 shows the results of the regression analysis of innovation and entrepreneurship climate and innovation and entrepreneurship mental health. All four dimensions of innovation and entrepreneurship climate significantly affect students' innovation and entrepreneurship mental health at the 0.05 level. The correlation regression coefficients are all less than 0.000, indicating that the enhancement of innovation and entrepreneurship atmosphere can also help students to solve the possible psychological problems, thus enhancing the psychological health under the influence of the environment. The correlation explanatory rates are all greater than 0.500, with the highest reaching 0.653, indicating that the effect of influence is more obvious. Overall, the effect of the independent variable AI on the mediator variable innovation and entrepreneurship atmosphere and the dependent variable innovation and entrepreneurship mental health is more significant, and through the application of AI technology, the innovation and entrepreneurship atmosphere can be improved, so that students can get more guidance and support, and reduce the threat of psychological problems to the innovation and entrepreneurship process.

Table 4: Regression analysis of atmosphere and mental health

Independent variable	Mental health in innovation and entrepreneurship									
	Compulsion	Paranoia	Hostile	Sensitive	Depression	Anxiety	Learning pressure	Maladjustment	Emotional instability	Psychological imbalance
Institutional support	-0.378**	-0.356**	-0.317**	-0.420**	-0.412**	-0.400**	-0.359**	-0.324**	-0.389**	-0.424**
Teachers and Guidance	-0.431**	-0.458**	-0.329**	-0.415**	-0.406**	-0.425**	-0.416**	-0.424**	-0.389**	-0.351**

Platform and Resources	-0.402 **	-0.413 **	-0.370 **	-0.326 **	-0.355 **	-0.367 **	-0.318 **	-0.427 **	-0.416 **	-0.468 **
Culture and Atmosphere	-0.360 **	-0.351 **	-0.426 **	-0.378 **	-0.342 **	-0.416 **	-0.362 **	-0.335 **	-0.405 **	-0.412 **
F	5.244 **	3.561 **	4.168 **	4.362 **	3.369 **	4.265 **	4.264 **	4.450 **	3.266 **	3.417 **
R2	0.613	0.648	0.653	0.537	0.616	0.534	0.552	0.517	0.528	0.569

IV. Conclusion

This paper uses quantitative analysis and multilayer recursive ridge regression method to analyze the influence mechanism of artificial intelligence technology on students' mental health in the innovation and entrepreneurship environment of colleges and universities. The use of AI technology in colleges and universities can inhibit the negative psychology of students in the process of innovation and entrepreneurship ($P < 0.05$), i.e., the higher the level of AI application, the lower the incidence of students' mental health problems. The explanation rate of artificial intelligence on the atmosphere of innovation and entrepreneurship is 0.402, 0.559, 0.441, 0.476; and the explanation rate on the psychological health of innovation and entrepreneurship is 0.501, 0.525, 0.519, 0.512, 0.507, 0.535, 0.542, 0.529, 0.567, 0.552. The explanatory rate of innovation and entrepreneurship climate on innovation and entrepreneurship mental health is greater than 0.500 in all cases. "Innovation and entrepreneurship atmosphere" plays a significant mediating role in the process of AI influencing students' innovation and entrepreneurship mental health ($P < 0.05$), which can indirectly improve students' psychological status by enhancing environmental support. In the future, more diversified AI tools can be explored to improve mental health counseling.

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