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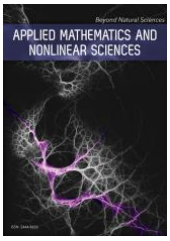

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Analysis of the Influence of Ideological and Political Education on Students' Psychological Cognition in Colleges and Universities in the Context of Informatization

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Abstract

To assist students develop sound moral principles and enhance their psychological and cognitive abilities, colleges and universities should provide them with ideological and political education. This study builds a standard regression model and a panel threshold regression model using statistical data collected from colleges and universities across the nation from 2012 to 2019 as an example. The models are evaluated for smoothness and multiple covariance by the testing process. Panel threshold regression and benchmark regression were employed to evaluate the impact of political and ideological education on learners' psychological cognition in colleges and universities. The findings indicate that, in the absence of a control variable, students' psychological cognition rises by 0.521 points for every percentage point increase in the intensity of ideological and political education provided by colleges and universities. The teaching content, cognitive mechanism, and psychological needs of political and ideological education in higher education institutions have a single threshold effect on the level of psychological cognition of students, with threshold values of 84.54, 29.16, and 35.98, respectively. Cognitive mechanisms and psychological needs are currently below these thresholds, and they will not exceed them. The psychological and cognitive development of the kids won't be affected by the level being below the threshold value. To enhance students' psychological cognition, civic education at colleges and universities must identify the psychological requirements of the students, comprehend the subject matter, and employ solid cognitive procedures.

Keywords: Panel threshold regression; Benchmark regression; Threshold effect; Psychological cognition.
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1 Introduction

In contemporary times, the swift advancement of science and technology has led to the network's gradual emergence as a means of communication between individuals. As a young demographic, college students frequently use the Internet to access a plethora of new information. However, the Internet also carries a double-edged sword, as it has the potential to cause significant harm [1]. Young people who have recently entered college in the virtual world often have psychological issues that are not resolvable because they often lack the right worldview, values, and viewpoint on life guidance. The virtual world can lead young people entering university to experience psychological problems due to their lack of guidance from correct worldviews, values, and life outlooks. From the 'network tool theory', came the development of networked ideological and political education." People take the initiative to enter the network and carry out the tasks of ideological and partisan education in synchronization with offline philosophical and political education through the establishment of theme websites and other means, and it has achieved some success [2–3].

The need to develop high-caliber talent in the new era is even more pressing, as General Secretary Xi Jinping stressed at the ideological as well as political work conferences of Chinese colleges and universities. He stressed that the teaching concept of 'people-oriented' and the importance of 'developing morality and nurturing people' are the main focus of educational and instructional objectives. The purpose of psychological education as a topic course is to allow students to demonstrate their attributes, such as brightness and confidence, positive optimism, and perseverance in real life, while also promoting the healthy development of their physical and mental health [4]. In the ideological and political education process, psychological education has a certain amount of foresight and educational value in helping students to build healthy interpersonal relationships with others, enhance their psychological quality and ability, and adapt to the harmonious development of the individual and society, among other things. The educational potential of it is unique [5].

By developing ideological and political psychological identities that are focused on students, it is possible to correctly understand their psychological cognition, emotional shifts, and behavioral traits. To improve the efficacy of the students' ideological and political education, colleges and universities should base their teaching of political and ideological theory on the psychological traits and ideological conceptions of their student body and devise a rational approach to teaching political theory [6]. In literature [7], the relationship between critical discourse analysis (CDA) and spatial cognition is investigated, and it is also examined for its potential and application in the study of ideological discourse. The nuanced ideological positioning in political discourse can be effectively captured by CDA, as it is noted. The literature [8] looks at the period when symbolization distributed information and predicts the future path of ideological and political education toward symbolization. Symbolization presents a new platform for ideological and political education. The effectiveness of the conversation with pupils on these topics is enhanced by changing how themes are related to one another. In the current setting, it is crucial to focus on the investigation of symbolic methods when researching ideological education. In order to improve the quality of students' personal character and establish a correct perspective on the three, literature [9] from the present state of students' ideological instruction in colleges and universities thoroughly analyzed the successful approaches of ideological education within colleges and universities, exploring the direction of reform as well as the development of the ideological education.

The literature [10] examines how colleges and universities are currently utilizing WeChat public number as a new forum for civic education, noting that network informatization has undermined the official discourse and authority of these institutions as well as mass communication schedule The goal of setting theory is to alter the audience's perceptions and comprehension to affect their actions and viewpoints. This is in line with the objective of civic education offered by universities and

colleges. As a result, the WeChat platform management ought to understand the implications of agenda-setting theory, cater to college students' requirements, establish the legitimacy of official discourse, and enhance the usefulness of civic and political education.

The process of utilizing psychological knowledge and pertinent practical skills to assist educated individuals in achieving good psychological traits, physical and mental well-being, realizing their own free and comprehensive development, and advancing the general enhancement of their moral and ideological attributes, scientific and cultural attributes, etc. is known as psychological education. Studies have been conducted to determine if voter opinions on candidates are impartial [11]. These studies show that voter opinions on candidates are not separate from each other. Through the collection of administrative records in hospitals, literature [12] aims to investigate the relationship between people's resistance to anxiety and depression and the regulation of their mental and physical well-being. According to the analysis, individuals who have a higher level of education are less likely to experience depression and anxiety than those who have a lower level of education.

In this work, we first sort through the fundamentals of the panel threshold regression model, estimating the model's parameter values using least squares estimation, and developing research hypotheses based on the factors that influence students' psychological cognition and the political and ideological education that colleges and universities provide. The smoothness test of the panel threshold regression model is used by the LLC and IPS techniques to ensure that the panel data is smooth enough for regression analysis. Second, the baseline regression framework and the group threshold regression model were constructed using data from self-assessment surveys conducted at colleges and universities nationwide from 2012 to 2019, with the psychological cognition of students serving as the explanatory variable and the instructional content, cognitive mechanism, and psychological requirements of political and ideological education in colleges and universities as the threshold variables. To confirm the threshold effect of the instructional content, cognitive mechanism, and psychological requirements of political and ideological education in colleges and universities upon the level of students' psychological cognition, the validity test was finally conducted based on the smoothness and convergence of the model, and the benchmark regression and variability test of the model were conducted.

2 Research hypotheses of students' psychological cognition

In the information era, multiculturalism has an influence on ideological and political education at colleges and universities. Students' psychological well-being can be negatively impacted by external information, which can lead to problems with their psychological cognition. Students' psychological cognition in college and university ideological and political education follows a gradual, step-by-step, and interconnected process that starts with knowledge literacy, internalizes psychology into their hearts, and ends with externalization in action. This chapter examines research hypotheses regarding the factors influencing students' psychological cognition, goes over the fundamentals of the panel threshold regression model, and offers a theoretical framework for the analysis that will follow regarding the precise impact of political and ideological education on students' psychological cognition.

2.1 Parameter Estimation of Panel Threshold Regression Models

1) Setting of threshold model

This study refers to Hansen's panel threshold regression model, a significant econometric model for examining nonlinear relationships between variables that may be used to the individual effects fixed

model in the case of non-dynamic data. The general idea is to split the sample into several subsamples based on the threshold value of the threshold variable, and then do regression analysis to get the estimated coefficients for each subsample.

If there is only one threshold value for the threshold variable, the basic form of the model is:

$$y_{it} = \mu_i + \beta_1' x_{it} I(q_{it} \le \gamma) + \beta_2' x_{it} I(q_{it} > \gamma) + \varepsilon_{it} \tag{1}$$

where the subscript i denotes the number and t denotes the time. y_{it} is the dependent variable, and x_{it} denotes the independent variable. $I(\cdot)$ is the indicative function, when the condition in parentheses is valid, the value of the function is 1, and vice versa, when the condition in parentheses is not valid, the value of the function is 0. q_{it} is the threshold variable, γ is the threshold value, according to the threshold variable in different threshold intervals, the sample data can be divided into two groups for fitting regression. The fitted regression coefficients for the two groups of data are β_1' and β_2', respectively. μ_i represents the individual effect, ε_{it} represents the random error term and the random error term is consistent with the Gaussian Markov assumption, i.e., ε_{it} is exogenous and satisfies the independent homogeneous distribution, zero mean, and homoskedasticity.

In this case, the threshold variable can be chosen either endogenous or exogenous.

Assuming a double threshold, the double threshold panel regression model is shown below:

$$y_{it} = \mu_i + \beta_1' x_{it} I(q_{it} \le \gamma_1) + \beta_2' x_{it} I(\gamma_1 < q_{it} \le \gamma_2) + \beta_3' x_{it} I(q_{it} > \gamma_2) + \varepsilon_{it} \tag{2}$$

where γ_1, γ_2 denotes the two thresholds, respectively, and the other variables have the same meaning as the variables in the single-threshold regression model described above.

The panel-based threshold regression model produces two types of outputs. Initially, the threshold estimates and the estimations of variables that can be explained by the model obtained through parameter estimation of the threshold regression model. The second step is to assess the presence of the threshold effect, the validity of threshold estimates, and the importance of the parameter estimates of the explanatory factors.

2) Panel cutoff regression model parameter estimation

The least squares technique of standardized data, or the deviation transformation OLS estimation, can be used to estimate the parameters of the panel threshold regression model, which is the same as the fixed effects model.

The single threshold model can be written in the form of the following equation:

$$y_{it}(\gamma) = \begin{cases} u_i + \beta_1' x_{it} + e_{it}, q_{it} \le \gamma \\ u_i + \beta_2' x_{it} + e_{it}, q_{it} > \gamma \end{cases} \tag{3}$$

Order:

$$\beta = \begin{pmatrix} \beta_1' \\ \beta_2' \end{pmatrix} \tag{4}$$

$$x_{it}(\gamma)=\begin{pmatrix} x_{it}I\left(q_{it}\le\gamma\right) \\ x_{it}I\left(q_{it}>\gamma\right) \end{pmatrix} \tag{5}$$

At this point equation (3) changes to:

$$y_{it}=u_i+\beta' x_{it}(\gamma)+e_{it} \tag{6}$$

To obtain the model parameter estimates, individual effects u_i were first eliminated using the method of departure transformation. The mean values of the observations for each variable within the group were first calculated to obtain the following mean model:

$$\overline{y_i}=u_i+\beta'\overline{x_i}(\gamma)+\overline{e_i} \tag{7}$$

Subtracting Eq. (7) from Eq. (6), the threshold regression model after decentering the sample data is obtained as:

$$y_{it}-\overline{y_i}=\beta'\left(x_{it}(\gamma)-\overline{x_i}(\gamma)\right)+\left(e_{it}-\overline{e_i}\right) \tag{8}$$

To wit:

$$y_{it}^{\ *}=\beta' x_{it}(\gamma)^{*}+e_{it}^{\ *} \tag{9}$$

Converting equation (9) into matrix form, it is:

$$Y^{*}=X(\gamma)^{*}\beta+e^{*} \tag{10}$$

The model is estimated using least squares with constrained parameter estimates β as:

$$\beta_{\gamma}=\left(X^{*}(\gamma)'X^{*}(\gamma)\right)^{-1}X^{*}(\gamma)'Y^{*} \tag{11}$$

Correspondingly, the residual estimate of the regression equation (10) is:

$$e^{*}(\gamma)=Y^{*}-X^{*}(\gamma)\beta_{\gamma}' \tag{12}$$

The residual sum of squares is:

$$\begin{aligned} \mathrm{SSE}(\gamma)&=e^{*}(\gamma)'e^{*}(\gamma) \\ &=Y^{**}\left[1-X^{*}(\gamma)'\left(X^{*}(\gamma)'X^{*}(\gamma)\right)^{-1}X^{*}(\gamma)'\right]Y^{*} \end{aligned} \tag{13}$$

γ is any value within the range of values taken by the threshold variable, and the best threshold estimate calculated by minimizing the residual sum of squares is as follows:

$$\hat{\gamma}=\arg\min_{\gamma}\mathrm{SSE}(\gamma) \tag{14}$$

Finally, the parameter estimates, residuals, and the residual sum of squares under the single-threshold regression model can be obtained by substituting the value of γ equations (11), (12), and (13).

2.2 Tests of Panel Threshold Regression Models

1) Panel Smoothness Test

Before conducting panel regression on panel data, the smoothness of the data needs to be tested. We are familiar with the previous methods used for time series DF, ADF, etc. The test results will be distorted if used directly for panel data, leading to a large error. Consider the following panel autoregressive model:

$$y_{it} = \rho_i y_{i,t-1} + z_{it}'\gamma_i + \varepsilon_{it} \tag{15}$$

where $i = 1, 2, \ldots, n$ denotes cross-sectional units, $t = 1, 2, \ldots, T_i$ denotes time, and ε_{it} is a smooth perturbation term. $z_{it}'\gamma_i$ denotes individual fixed effects with a linear time trend, i.e. $z_{it}' = (1, t)$.

The original and alternative hypotheses for the panel unit root test are:

$$H_0 : \rho_i = 1, \forall i; H_1 : \rho_i < 1 \tag{16}$$

Equation (15) can be written in equivalent form:

$$\Delta y_{it} = \delta_i y_{i,t-1} + z_{it}'\gamma_i + \varepsilon_{it} \tag{17}$$

where $\delta_i \equiv \rho_i - 1$. The corresponding original and alternative assumptions become:

$$H_0 : \delta_i = 0, \forall i; H_1 : \delta_i < 0 \tag{18}$$

In the smoothness test of panel data, we usually use the LLC test and IPS test method, both tests are used to balance the panel, but LLC applies to the same root and IPS applies to different roots.

2) Models with random and fixed effects

It is preferable to utilize the fixed effects model with the mixed regression model rather than the random effects model when the cross-section of the panel data gathered encompasses all units of the total.

According to the many aspects of human control, fixed-effects models are divided into individual fixed-effects models, temporal fixed-effects models, and two-way fixed-effects models; the basic form of individual fixed-effects models is:

$$\bar{y}_i = \bar{x}_i'\beta + z_i'\delta + u_i + \bar{\varepsilon}_i \tag{19}$$

De-averaging equation (19) gives its divergence form:

$$y_{it} - \bar{y}_i = (x_{it} - \bar{x}_i)'\beta + (\varepsilon_{it} - \bar{\varepsilon}_i) \tag{20}$$

Similarly, the general form of the time-fixed effects model is:

$$y_{it} = x_{it}'\beta + z_i'\delta + \gamma S_t + u_i + \varepsilon_{it} \tag{21}$$

The γS_t in equation (21) is the time-fixed effect, as derived by defining dummy variables using the LSDV method:

$$y_{it} = x_{it}'\beta + z_i'\delta + \gamma_2 D2_t + \ldots\ldots + \gamma_T DT_t + u_i + \varepsilon_{it} \tag{22}$$

Equation (22) has taken into account both individual fixed effects and time-fixed effects, which can be recognized as two-way fixed effects. In this study, two-way fixed effects control is used for both province and year dimensions, which yields more precise results.

They may be divided into fixed effects models and random effects models depending on how individual effects are handled. A fixed effects model is one in which u_i and X_{it} are associated, whereas a random effects model is the opposite."

The choice of the model must be made before executing the panel regression model. The selection of fixed effect and random effect models can be based on the Hausman test, which can be used to determine whether the individual effect u_i is associated with other explanatory factors. In essence, the idea is that, assuming that there is no correlation between u_i and other explanatory variables, the parameter estimates derived from the within-groups transformation method for the fixed effects model and the GLS method for the random effects model are both unbiased and consistent, with the exception that the former method is invalid. If the initial assumption is incorrect, the random effects model loses its consistency, but the parameter estimates from the fixed effects model stay consistent. Because of this, the parameter estimates of the two should not differ much from the original hypothesis, and statistical test quantities may be created based on the differences between the parameter estimates of the two.

2.3 Research hypotheses on students' psychological perceptions

A thorough examination of how political and ideological education affects students' psychological cognition in college and university settings within the framework of information technology can effectively improve the effectiveness of political and ideological theory classroom instruction, raise students' awareness of political and ideological education, assist students in establishing accurate psychological stereotypes, and support the advancement of students' psychological well-being. This study synthesizes the relevant literature and bases its conclusions on the following theories regarding how political and ideological education affects the psychological cognition of college and university students.

H1: Students' psychological cognition is positively impacted by the quality of political and ideological instruction they get in colleges and universities.

H2: Students' psychological cognition is impacted to a threshold degree by the ideological and political education courses taught at colleges and universities.

H3: The cognitive process of political and ideological education in colleges and universities has a threshold impact on students' psychological cognition.

H4: The psychological requirements of political and ideological education in colleges and universities have a threshold influence on students' psychological cognition.

3 Selection of research variables and data sources

Because higher education is crucial for a student's psychological, cognitive, and mature growth, it puts them at risk for a variety of issues. First-year students are more likely to struggle with adaptability and interpersonal relationships because they have not yet fully transitioned from high school to college, whereas graduates are more likely to face pressure from employers and other issues related to career planning and employment. The potential for psychological problems in students can arise from all of these issues. If they are not well addressed, they may also cause students to experience a range of unfavorable feelings, which may impact how well they comprehend and accept political and ideological instruction in colleges and universities. The main topic of this chapter is the selection of variables that can influence the psychological cognition of college and university students through political and ideological education. The correlation analysis between political and ideological education and students' psychological cognition is based on this as the basis for the subsequent examination.

3.1 Selection of research variables and data sources

Among the variables utilized to build the panel threshold regression model in the empirical evidence presented in this paper, the explanatory variable is the students' psychological cognition; the threshold variable is the teaching content, cognitive mechanism, and psychological requirements of political and ideological education in colleges and universities; the control variables are the academic performance, extracurricular activities, family background, and Internet factors; and the affiliated disciplines and colleges and universities are the affiliated disciplines. The variables in the panel threshold model of this research are derived from pertinent statistical data as well as the self-assessment reports of significant colleges and universities nationwide from 2012 to 2019. The outcomes of each variable's descriptive statistics data are displayed in Table 1. According to the statistical findings, students' psychological cognition is somewhat impacted negatively by the three variables of related disciplines, after-school activities, and Internet elements; their minimum values are -1.307, -1.035, and -0.864, respectively. The Internet may have an impact on how colleges and universities in the information era educate their students ideologically, and the quality of their after-school programs will also likely have a significant impact on how well students think psychologically.

Table 1. Description statistics results for each variable

Variable	Code	Min	Max	Means	SD
Students' psychological cognition	SPC	1.315	4.336	3.211	0.063
Ideological and political education	IPE	0.596	4.967	3.326	0.449
Content of courses	CC	1.263	4.692	3.138	0.203
Cognitive mechanism	CM	0.339	4.835	3.243	1.101
Psychological need	PN	0.548	4.116	3.465	1.136
The subject	TS	-1.307	4.859	2.852	0.839
Affiliated colleges	AC	0.646	4.701	2.948	0.851
Family background	FB	1.202	4.996	3.256	1.024
Academic record	AR	1.523	3.652	3.437	0.773
After-school life	AL	-1.035	4.328	3.834	0.668
Internet factors	INT	-0.864	4.337	2.669	1.135

3.2 Construction of panel threshold regression model

at order to investigate the type of linear effect connection that exists between ideological and political education at colleges and universities and students' psychological cognition, this work first builds a static panel model. The research presents several control variables through theoretical analysis and constructs the benchmark regression model in the following manner, while taking into account the many elements that impact students' psychological cognition.

$$SPC_{it} = \alpha_0 + \alpha_1 IPE_{it} + \sum_{i=1}^{m} \varphi_i Control_{it} + \varepsilon_{it} \tag{23}$$

Where, i represents different schools, t represents practice, SPC_{it} represents students' psychological cognition, IPE_{it} represents the strength of ideological and political education in colleges and universities, $Control_{it}$ represents control variables, $\alpha_0, \alpha_1, \varphi_i$ is the coefficient corresponding to each explanatory variable, and ε_{it} is the random disturbance term.

To provide more insight into how students' psychological and cognitive situations and the nonlinear connection are impacted by the three factors of teaching content, cognitive mechanism, and psychological requirements under political and ideological instruction in colleges and universities. The segmentation function of the impact of political and ideological instruction in colleges and universities on students' psychological cognition is constructed using the panel threshold regression framework proposed by Hansen. The threshold variables taken into consideration are the instructional content, mental mechanisms, and psychological needs of philosophical and partisan education in colleges and universities. Set as the panel cutoff model:

$$\begin{aligned} SPC_{it} = {} & \beta_0 + \beta_1 CC_{it} \cdot I(q_{it} \le \gamma_1) + \beta_2 CM_{it} \cdot I(\gamma_1 < q_{it} \le \gamma_2) \\ & + \beta_3 PN_{it} \cdot I(q_{it} > \gamma_2) + \theta Control_{it} + e_{it} \end{aligned} \tag{24}$$

In the formula, SPC_{it} is the explanatory variables, $CC_{it}, CM_{it}, PN_{it}$ represents the threshold variables, which are the teaching content, cognitive mechanism and psychological needs of ideological and political education in i school t period, respectively. γ_1, γ_2 is the threshold value to be estimated, $\beta_0, \beta_1, \beta_2, \beta_3$ is the regression coefficient under different threshold intervals, $I(\cdot)$ is the schematic function, which takes the value of 1 if the conditions in parentheses are met and 0 otherwise, $Control_{it}$ is a series of control variables, θ is the regression coefficient of the control variables, and ε_{it} is the random error term.

4 Empirical analysis of factors influencing students' psychological cognition

The information age has caused college students to face more pressure to excel in talent competition, higher expectations from society, and increased physical and mental strain. All of these factors have played a role in some degree of errors in students' psychological cognition. Ideological and political scientists working in colleges and universities in this new era of development should focus on strengthening mental health education as well as fostering college students' healthy psychological cognition in addition to upholding the benefits of traditional ideological and political education. This chapter examines in detail the factors that influence ideological and political education in higher education institutions on students' psychological cognition, based on the pertinent panel threshold regression model provided in the previous section. The goal of this analysis is to provide a resource for improving students' psychologically accurate cognition.

4.1 Stability and multicollinearity tests

4.1.1 Stability tests

Even though the ratio to the regression sum of rectangles to the sum of squares of the total deviation is high—that is, there is a high R-squared value—because some non-smooth data may exhibit a common trend of change and these data themselves might not necessarily demonstrate a direct correlation, the regression of these data at this time results in pseudo-regression because the results are not practically significant. In order to prevent this scenario and secure the accuracy of the estimation findings, it is necessary to examine the smoothness of the variables. This work uses two separate unit root test techniques for panel data, namely the same root unit root test LLC test and the different roots unit root test Fisher-ADF for smoothness test, due to the panel data's inherent complexity. The results of the unit root tests for the variables are specifically displayed in Table 2.

The original hypothesis of the existence of a unit root cannot be rejected based on the test results of the level series, the Fisher-ADF test, and the significance test results corresponding to the test results for each of the related disciplines, the affiliated universities, and the family background, all of which are greater than 0.1. The original data's smoothness and the presence of a unit root indicate that. This is why the data are processed using the difference form in this paper. Following a second unit root test, the data are found to be smooth and meet the threshold regression's variable smoothness requirements because the p-value for each test statistic value in the LLC and Fisher-ADF tests is less than 0.01 and rejects the original hypothesis that a unit root exists.

Table 2. Unit root test results

Variable	Code	LLC test	Fisher-ADF test
Students' psychological cognition	SPC	-4.531***(0.001)	3.693***(0.002)
Ideological and political education	IPE	-4.152***(0.003)	3.117***(0.005)
Content of courses	CC	-3.065***(0.000)	3.184***(0.001)
Cognitive mechanism	CM	-2.359***(0.002)	2.986***(0.004)
Psychological need	PN	-3.238***(0.005)	3.107***(0.000)
The subject	TS	-5.568***(0.001)	3.048 (0.925)
Affiliated colleges	AC	-3.639***(0.000)	2.735 (0.847)
Family background	FB	-2.725***(0.004)	3.249 (0.469)
Academic record	AR	-3.265***(0.001)	4.552***(0.003)
After-school life	AL	-2.868***(0.000)	2.948***(0.001)
Internet factors	INT	-3.092***(0.002)	3.287***(0.000)

4.1.2 Tests for multicollinearity

Multicollinearity between multiple data indicators will have a more significant impact on the outcomes because this study incorporates more data indicators. Therefore, multicollinearity must be checked in the data before empirical analysis. According to the rule of thumb, if the variance expansion factor $VIF = \max\{VIF_1, VLF_2, ...\} \le 10$, it means that there is no significant multicollinearity between the variables. The multicollinearity significance test was performed on the data in this research using the SPSS program, and Table 3 displays the outcomes of computing the variance inflation factor for each variable. According to the multiple collinearity test findings, the variance inflation factor of the teaching content index for political and ideological instruction in

colleges and universities is the highest. Its VIF value is 0.96618, which is significantly less than 10. This indicates that the data for each variable in this paper do not significantly exhibit multicollinearity, and the different variables can be used to infer the particular influences of political and ideological education in colleges and universities on students' psychological cognition.

Table 3. Results of the variance inflation factors for each variable

Variable	VIF	1/VIF
Students' psychological cognition	1.047	0.95511
Ideological and political education	1.135	0.88105
Content of courses	1.035	0.96618
Cognitive mechanism	1.063	0.94073
Psychological need	1.045	0.95699
The subject	1.140	0.87712
Affiliated colleges	1.139	0.87796
Family background	1.104	0.90577
Academic record	1.095	0.91324
After-school life	1.051	0.95148
Internet factors	1.130	0.88495

4.2 Benchmark regression results and correlation tests

4.2.1 Analysis of baseline regression results

This study's variables do not have significant covariance issues, as demonstrated by the results of the multiple covariance test. This study uses a progressive regression treatment to investigate the marginal impact of the quality of political and ideological instruction in higher education institutions on students' psychological cognition without taking into account threshold variables and threshold effects. The results of its benchmark regression are displayed in Table 4. The effects of political and ideological education intensity on students' psychological cognition in both the absence and presence of control factors are shown by SPC (1) and (2) in the table, respectively.

Regardless of whether the six control variables of liable affiliation, college affiliation, family background, academic achievement, extracurricular life, and Internet factors are included or not, the quality of political and ideological instruction in colleges and universities has a significant positive impact on students' psychological cognition at the 1% level, according to the benchmark regression results. The correlation coefficient is still strong at 0.521, even though it drops to 0.258 when control variables are included. With no control variables, the R-square test result is 0.629, meaning that 62.9% of the psychological cognitive level of students can be explained by the quality of political and ideological instruction provided at colleges and universities. To conclude, improving ideological and political education in educational institutions will positively contribute to the development of students' psychological cognition. The higher a student's psychological cognitive ability is, the higher the level of philosophical and political education in colleges and universities, as demonstrated by H1.

Table 4. Analysis of the benchmark regression results

Variable	Code	SPC (1)	SPC (2)
Ideological and political education	IPE	0.521***(13.42)	0.258***(4.64)
The subject	TS	-36.061***	-52.064***(-4.42)
Affiliated colleges	AC	-	-4.753*(-0.56)
Family background	FB	-	1.108**(1.13)
Academic record	AR	-	-3.759***(-2.96)
After-school life	AL	-	-2.945**(-4.09)
Internet factors	INT	-	-9.342***(2.78)
(Content)	_Con	13.429***(9.26)	52.584***(3.65)
R square	R^2	0.629	0.553
F value	F	156.459	98.946

4.2.2 Regression endogeneity test

Since there may be a causal relationship between students' psychological cognition and the quality of ideological and political education they receive in colleges and universities, this means that the degree of psychological cognition students receive influences the quality of ideological and political education they receive, and the degree of psychological cognition students receive can influence the quality of ideological and political education they receive through a variety of mechanisms. The symbiosis between college ideological and political education technology and technology is evaluated using the 2SLS approach in this article. The empirical regression findings of this method are displayed in Table 5. The instrumental variable regression findings reveal a negligible difference between the R-square test results and the baseline regression results, with a difference of 0.016. There is no significant difference between the test results on other variables and the baseline regression results. The quality of ideological and political instruction received by students in colleges and universities has a positive impact on their psychological cognition.

Table 5. Regression endogeneity test

Variable	Correlation	T value	Sig.
SPC	0.517***	7.823	0.002
IPE	0.173***	4.952	0.005
TS	-6.957***	-3.347	0.000
AC	-4.621*	-2.598	0.001
FB	1.106**	3.125	0.024
AR	-5.564***	-4.554	0.011
AL	-3.659***	-6.021	0.003
INT	-8.164***	-3.038	0.009
_Con	1.824***(9.26)	22.352	0.001
R^2	0.613		

4.3 Panel Threshold Regression Model Results

4.3.1 Threshold existence tests

The threshold value of the threshold variable is utilized as the regression equation splitting point, following the threshold model's research idea, to determine if there is a stage difference in the threshold variable's contribution to the explanatory variables. The threshold model is determined by the test P-value and conducted using SPSS software for self-sampling tests of single, double, and triple thresholds. These three core explanatory variables, teaching content, cognitive mechanism, and psychological needs, are chosen as the threshold variables for ideological and political education in colleges and universities. Table 6 presents the results of the threshold existence test. The P-values for the cognitive mechanism, psychological requirements, and teaching content of political and ideological education in colleges and universities are 0.01–0.02, 0.02–0.01, and 0.01 respectively, according to the test results of threshold existence, suggesting the existence of a single threshold effect. The quality of political and ideological instruction offered at colleges and universities can be altered by the influence of these three threshold factors on students' psychological cognition.

Table 6. The threshold test results

Variable	Threshold model	F	P	Critical value		
				1% level	5% level	10% level
CC	Single threshold	11.75	0.01	9.02	10.07	12.34
	Double threshold	8.29	0.35	11.35	12.98	15.93
	Triple threshold	5.83	0.79	20.98	23.49	30.08
CM	Single threshold	23.15	0.02	9.58	10.26	13.86
	Double threshold	9.64	0.53	11.84	13.22	16.64
	Triple threshold	6.31	0.69	19.47	18.17	20.65
PN	Single threshold	11.29	0.01	7.12	10.76	14.27
	Double threshold	8.35	0.37	13.19	14.97	17.81
	Triple threshold	6.57	0.46	15.67	18.49	20.69

To ascertain if a threshold effect exists, the single threshold's level of threshold value needs to be further assessed. Therefore, Table 7 shows the threshold estimates for the three threshold variables. The data in the table clearly show that the single threshold estimates of the cognitive mechanism, psychological needs, and teaching content of political and ideological education in colleges and universities are, respectively, 29.16, 33.98, and 84.54. The estimation of the parameters for the surface threshold regression performed below is aided by these estimates that provide data support.

Table 7. Threshold estimates for gate stroke variables

Variable	Threshold model	Threshold estimate	The 95% confidence interval
CC	Single threshold	84.54	[83.98,85.02]
CM	Single threshold	29.16	[28.36,29.49]
PN	Single threshold	35.98	[34.32,36.28]

4.3.2 Analysis of threshold regression results

1) Content cutoff model parameter estimation instruction

Figure 1 shows the single threshold estimates of the teaching material for ideological and political education in higher education institutions, which was obtained by combining the desired likelihood ratio with the already-existing, pertinent research ideas. Table 8 demonstrates the estimated parameter results for the instructing content threshold model.

It can be explained that colleges and universities across the nation can be divided into two groups based on whether or not they cross the threshold value: high quality and low quality. This is based on the threshold estimate value of 89.45 for the teaching content of political and ideological education in colleges and universities, which serves as the boundary. The regression coefficient is 0.173, significant at the 5% level when the quality of political and ideological instruction taught at universities and colleges exceeds the threshold value of 84.54. On the other hand, the regression coefficient for instructional content below the threshold quality is 0.053, which indicates significance at the 1% level. Therefore, H2 is verified and the single threshold regression results show that the way ideological and political education is constructed and taught in colleges and universities, regardless of its level, can influence students' psychological cognition. The relationship between the teaching content of political and ideological education in colleges and universities and the psychological cognition of students is not linear. The results demonstrate threshold characteristics, i.e., the positive impact of the teaching content on students' mental cognition is significantly greater when the caliber of the teaching content is higher than the threshold than when it is lower or higher than the threshold. Political and ideological instruction in higher education institutions can only play a more fully realized function in fostering students' psychological cognition if the quality of its instructional content reaches a particular threshold.

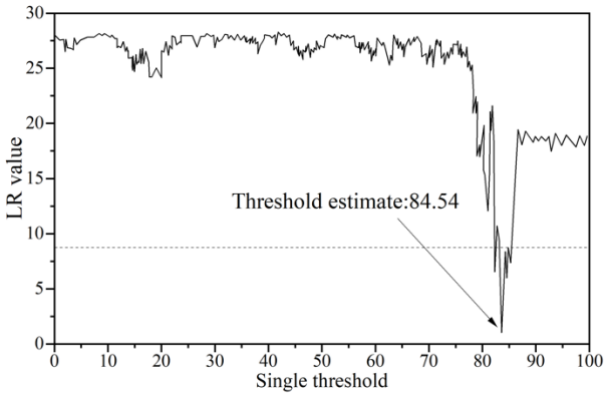

Figure 1. Single-threshold estimation results-content of courses

Table 8. Parameter estimation of the threshold model for content courses

Variable	Code	Correlation	T value
The subject	TS	-0.736***	-3.956
Affiliated colleges	AC	-0.023	-0.164
Family background	FB	15.492	0.089
Academic record	AR	-22.378***	-5.867
After-school life	AL	1.385	0.231
Internet factors	INT	0.006	0.883
Students' psychological cognition	(CC≤84.54)	0.053***	2.389
	(CC>84.54)	0.173**	5.227
(Content)	_Con	1.824***	9.263
Note: *, * * ,* * * is significant at 10%, 5% and 1%, respectively.			

2) Parameter estimation of cognitive mechanism threshold model

The only threshold estimates results of the cognitive process of ideological and political education in colleges and universities are displayed in Figure 2, and the parameter estimation results of the threshold framework of the cognitive mechanism are displayed in Table 9. The minimum threshold effect of the cognitive mechanism of ideological and political schooling in colleges and universities is tested using the same methodology.

Colleges and universities across the nation can be divided into two groups based on whether or not they traverse the threshold value of 29.16 for the cognitive mechanism of political and ideological instruction in colleges and universities. This is determined by the results of the single-threshold estimation, which employs this value as the divider. The psychological cognition level of college students is positively promoted by the cognitive process of political and ideological instruction in colleges and universities when the threshold value of the cognitive mechanism is higher than 29.16, as indicated by the regression coefficient of 0.085. H3 is verified. When the threshold value of the cognitive mechanism is less than 29.16, the regression coefficient for the psychological thinking level of college scholars is 0.024, and there is no significant difference. According to the threshold regression's findings, the cognitive mechanism of political and ideological education in colleges and universities is no longer relevant in raising students' psychological cognition levels if it is less than the threshold value. Therefore, to assist students in raising their psychological and cognitive levels, political and ideological education in colleges and universities must develop a robust cognitive system.

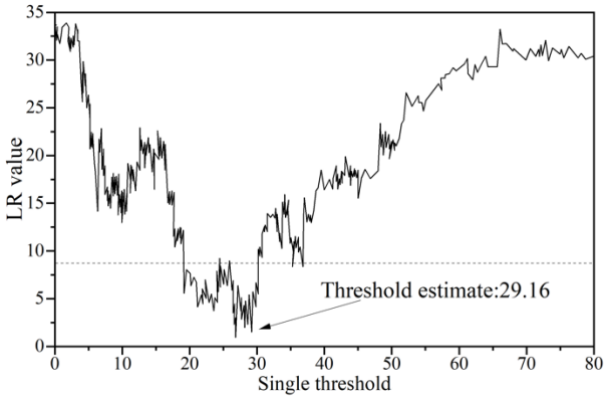

Figure 2. Single-threshold estimation results- cognitive mechanism

Table 9. Parameter estimation of the threshold model for cognitive mechanism

Variable	Code	Correlation	T value
The subject	TS	-0.669***	-3.691
Affiliated colleges	AC	0.069	0.386
Family background	FB	18.243	0.937
Academic record	AR	-22.186***	-5.842
After-school life	AL	3.546	0.374
Internet factors	INT	0.038	-0.249
Students' psychological cognition	(CM≤29.16)	0.024	0.778
	(CM>29.16)	0.085***	4.362
(Content)	_Con	2.068***	2.874
Note: *, * * ,* * * is significant at 10%, 5% and 1%, respectively.			

3) Parameter estimation of psychological demand threshold model

Using the same methodology, the threshold effect of the psychological requirements of political and ideological instruction in colleges and universities can be evaluated. Figure 3 displays the results of this test for single threshold estimation, while Table 10 displays the parameter estimation of the psychological needs thresholds model.

Colleges and universities across the nation have two distinct categories of psychological need satisfaction: high satisfaction and low satisfaction. This is because the quality of mental needs of ideological and political education in these establishments is measured using a threshold of 35.98. The regression coefficient of ideological and political education in colleges and universities is significant at the 1% level when the quality of psychological demands fulfillment is more than 35.98; conversely, there is no significant difference. This indicates that when political and ideological instruction in colleges and universities is based on the psychological needs of the students, it will raise those students' psychological cognition levels and, conversely, it won't have an impact on those levels. As a result, H4 is confirmed. The more political and ideological instruction of colleges and universities meets the needs of their students, the promotion effect on their psychological cognition level becomes more evident. Conversely, if the level of philosophical and political education in colleges and universities falls short of a certain threshold, the psychological needs of the mental cognitive level of the promotion of the students' level will become less important.

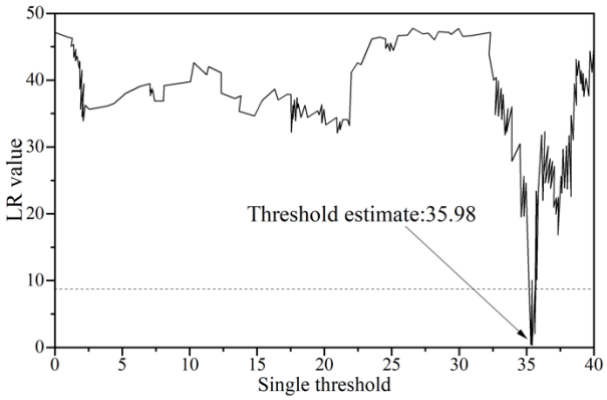

Figure 3. Single-threshold estimation results- psychological need

Table 10. Parameter estimation of the threshold model for psychological need

Variable	Code	Correlation	T value
The subject	TS	-0.779***	-4.426
Affiliated colleges	AC	-0.038	-0.229
Family background	FB	19.475	0.307
Academic record	AR	-16.356***	-4.378
After-school life	AL	-1.969	-0.223
Internet factors	INT	0.108	1.214
Students' psychological cognition	(PN≤35.98)	0.001	0.086
	(PN>35.98)	0.098***	4.426
(Content)	_Con	0.215***	2.215
Note: *, * * ,* * * is significant at 10%, 5% and 1%, respectively.			

5 Conclusion

In this paper, the influence elements of political and ideological instruction in higher education institutions on students' psychological cognition are analyzed using the panel threshold regression model, with example data drawn from the self-assessment reports of top colleges across the nation from 2012 to 2019 and related statistics. The following conclusions are reached:

1) There is a significant ($p < 1\%$) relationship between the strength of political and ideological instruction in colleges and universities and students' psychological cognition. The correlation coefficient among the two is 0.521 in the absence of a control variable and drops to 0.258 in its presence. The degree of students' psychological cognition will be positively impacted by the pertinent measures of political and ideological instruction in colleges and universities, therefore it is important to concentrate on the methods and strategies of ideological and political education to The psychological cognition of the pupils ought to be enhanced.

2) There is a single threshold impact on students' psychological cognition level that is caused by the instructional material, cognitive process, and psychological demands of political and ideological education in colleges and universities. Students' emotional cognition level is significantly affected by the instructional material when all three threshold factors are below their respective threshold levels. Additionally, all three threshold factors will significantly improve students' psychological and cognitive levels when they are above their respective thresholds.

3) In colleges and universities, ideological and political education must fully comprehend the emotional requirements of students to innovate the teaching content, improve the cognitive mechanism, and better guide the advancement of students' psychological cognition. The improvement of students' mental health will also be ensured.

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References

[1] Feng, S., Wong, Y. K., Wong, L. Y., & Hossain, L. (2019). The internet and facebook usage on academic distraction of college students. Computers & Education, 134(JUN.), 41-49.

[2] Chen, D., Kong, X., & Wei, Q. (2020). Design and development of psychological virtual simulation experiment teaching system. Computer Applications in Engineering Education.

[3] Ko, C. H., & Shen, Y. (2021). Design and application of mobile education information system based on psychological education. Mobile information systems.

[4] Maria, José, Nogueira, Luisa, Barros, & Carlos. (2017). Psychometric properties of the psychological vulnerability scale in higher education students. Journal of the American Psychiatric Nurses Association.

[5] Korcz, N., Janeczko, E., Bielinis, E., Urban, D., Koba, J., & Szabat, P., et al. (2021). Influence of informal education in the forest stand redevelopment area on the psychological restoration of working adults. Forests(8).

[6] Wong, M. Y. (2020). University students' perceptions of learning of moral education: a response to lifelong moral education in higher education. Teaching in Higher Education(3), 1-18.

[7] Cap, & Piotr. (2017). Studying ideological worldviews in political discourse space: critical-cognitive advances in the analysis of conflict and coercion. Journal of Pragmatics, 108, 17-27.

[8] Ruixue, X. U. (2018). Exploration on symbolization of ideological and political education in the "internet plus" era. Journal of Higher Education.

[9] Yang, Y. (2017). Research on the effective model of ideological and political classroom teaching in colleges and universities under new media background. Revista de la Facultad de Ingenieria, 32(15), 679-684.

[10] Dongjing, Z., & Junlin, H. (2018). Research on the construction of the official we chat public platform in colleges and universities based on the theory of "agenda setting". Journal of Higher Education.

[11] WAISMEL-MANOR, ISRAEL, SIMONOVITS, & GABOR. (2017). The interdependence of perceived ideological positions: evidence from three survey experiments. Public Opinion Quarterly, 81(3), 759-768.

[12] Novi, C. D., Leporatti, L., & Montefiori, M. (2021). The role of education in psychological response to adverse health shocks. Health Policy(9464).

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