

Retraction

Retracted: Dynamic Early-Warning Model of College Students' Psychological Crisis Based on Characteristic Attribute

Scientific Programming

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] X. Chen, "Dynamic Early-Warning Model of College Students' Psychological Crisis Based on Characteristic Attribute," *Scientific Programming*, vol. 2022, Article ID 6026248, 11 pages, 2022.

Research Article

Dynamic Early-Warning Model of College Students' Psychological Crisis Based on Characteristic Attribute

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At present, the existing dynamic early-warning model of college students' psychological crisis cannot obtain psychological characteristics, and the error of psychological crisis prediction is large. The early-warning result of psychological crisis appears big deviation. A new dynamic early-warning model of college students' psychological crisis is designed based on characteristic attributes. In the process of modeling negative psychological crisis of college students, the fusion constraint fuzzy theory obtains the essence of college students' psychology from subjective and objective reasons, gives the different stages of college students' psychology, obtains the corresponding information entropy of the behavior hindrance in each stage of college students' psychology, and calculates the threshold value of the behavior tendency of college students' psychology. Based on the psychological state information of college students obtained by perception, the fuzzy comprehensive early-warning data model of feature attributes is constructed. According to the fuzzy comprehensive early-warning method and the early-warning index system, the early-warning factor set of college students' psychological crisis is constructed, and the dynamic early-warning model of college students' psychological crisis is constructed. Experimental results show that the mining results are consistent with the actual situation, and the grey relational degree, small error probability, and mean square ratio index are better than the present model.

1. Introduction

With the development of the economy, the introduction of social competition mechanism and the enlargement of the enrollment scale of colleges and universities, the conflicts, and pressures in the fields of ethics, values, behavior patterns, interpersonal relationships, employment, and job hunting of college students are increasing, and the probability of psychological frustration is increasing [1]. College students are just coming of age and are about to enter the transitional period of society. They are often faced with pressure and confusion in all aspects of study, employment, love, and family. College students are more likely to have various psychological problems and have low self-healing ability. The obsessive-compulsive symptoms, anxiety, phobia, and psychosis of Chinese college students are significantly higher than the national norm. Therefore, in the process of education and teaching, colleges and universities should not only pay attention to the cultivation of college

students' professional learning skills and the improvement of their ideological and moral qualities but should also pay more attention to the mental health of college students. Survey shows that college students have become a high incidence group of mental diseases. College students account for 20% of the patients with mental diseases and 50% of the dropouts due to mental diseases. Moreover, there is an upward trend [2, 3]. Mental diseases generally have four stages of development: psychological crisis → psychological barriers → mental illness → psychological decline. A psychological crisis is an early symptom of mental illness. When a person is confronted with a difficult situation, and his previous way of dealing with the problem and his usual supporting model is not enough to deal with the present situation, that is, the difficult situation he has to face exceeds his ability to deal with the problem, the person will have temporary psychological distress. This temporary psychological imbalance is the psychological crises [4–6]. A psychological crisis is a sign that one is experiencing upheaval

and turmoil in one's life. It temporarily interferes with or disrupts one's habitual pattern of life, characterized by high levels of tension, accompanied by anxiety, frustration, and confusion. The psychological crisis of college students can lead to behavioral or emotional disorders and even lead self-injury or injury and other serious consequences [7]. But people's psychological problems from the emergence to the degree of serious need to go through a gradual development process; if the problem in this process is resolved or alleviated, then the tragedy may not occur [8]. At present, psychological crises caused by psychological problems on university campuses are on the rise, and it is not uncommon to see all kinds of out-of-control behaviors from stress, depression to self-injury, and other injuries. It is very urgent to study the methods of predicting the psychological crisis of college students.

College students' psychological crisis early-warning model refers to a kind of psychological crisis management model by means of a set of scientific early-warning index system and crisis evaluation model, through analyzing and comparing the collected early-warning information, timely discovering and identifying the potential or actual crisis factors, giving out the crisis alarm, immediately activating the emergency plan for crisis, preventing the outbreak of crisis, and reducing the loss of crisis [9, 10]. With the rapid development of science and technology, the quickening pace of life, and the complexity of interpersonal relationship, the pressure and conflict of college students in the fields of values, ethics, behavior, employment, and so on are increasing, the psychological crisis is escalating, and malignant incidents emerge one after another, and psychological problems of college students have gradually become the focus of the whole society. The control and response of college students' psychological crisis are based on accurate identification and early warning [11]. The correlation and redundancy among the indicators of the early-warning model of psychological crisis is one of the effective methods to identify crisis signals and reduce crisis components [12].

Reference [13] established a correlation prediction model between adolescent blind obedience psychology and criminal behavior using the multiobjective evolutionary algorithm. Firstly, the risk factors and protective factors of teenagers' social growth are screened from the perspective of individual, family, school, and society; secondly, the support degree of fuzzy item set of each factor is defined; thirdly, the weight vector of the characteristic index of criminal psychological manifestation of teenagers' blind obedience is calculated; finally, the grey correlation method is used to extract the subjective and objective factors of teenagers' criminal psychology. An accurate correlation prediction model between adolescent blind obedience psychology and criminal behavior is established. Reference [14] takes the learning performance of knowledge and skills of crisis intervention as the intermediary variable to explore the influence process of emotional intelligence on the performance of crisis intervention behavior. Based on the sequence pattern analysis and comprehensive evaluation of learning performance in the previous research, the emotional intelligence of 104 mental health service personnel

was collected through the emotional intelligence scale, and the intermediary effect model was used to analyze the relationship between emotional intelligence, learning performance, and behavior performance.

However, the above dynamic early-warning model of college students' psychological crisis cannot obtain the attribute of psychological characteristics, and the prediction error of psychological crisis is large. Most of these studies stay at the level of mental health education, and there is no effective means to predict whether college students have a psychological crisis. People's psychological activities are extremely complex, and the process of change is not visible. The psychological crisis prediction can detect problems as early as possible, and timely intervention measures can be taken to effectively avoid the consequences of the formation and deterioration of the psychological crisis. For this reason, a dynamic early-warning model of college students' psychological crisis based on characteristic attributes is designed. This paper introduces the grey Verhulst forecasting model to analyze the characteristic attributes of college students' psychological crisis. Combining the theory of constraint fuzzy theory from subjective and objective reasons, the essence of college students' psychology is obtained. According to the corresponding information entropy of the behavioral obstacles in the various stages of the college students' psychology, the threshold of the behavior tendency of the college students to produce psychology is calculated. Early-warning indicators is set, and the construction of a dynamic early-warning model of college students' psychological crisis is completed.

2. Dynamic Early-Warning Model of College Students' Psychological Crisis Based on Characteristics

2.1. Research on the Characteristics of College Students' Psychological Crisis. The proposed method uses the grey Verhulst prediction model [15, 16] to study the characteristic attributes of college students' psychological crisis. The grey Verhulst prediction model combines the advantages of the Verhulst model. This model is suitable for non-monotonic swing development sequence or S-shaped sequence with saturation. The characteristics of psychological crisis of college students belong to the category of non-monotonous swinging development, so the grey Verhulst predictive model is used to analyze the attributes of psychological crisis.

The initial value $X^{(1)}(0) = X^{(0)}(1)$ is set, the parameter column $Y = [x, y]^T$ is brought into the whitening equation, the differential equation is solved, and the whitening equation solution corresponding to the grey Verhulst model is obtained as follows:

$$X^{(0)}(t) = e^{at} \left[\frac{(1 - e^{-2})}{X^{(1)}(0)} - \frac{y}{x} \right]^{-1}. \quad (1)$$

Let $X^{(0)} = [x^{(0)}(1), x^{(0)}(2), \dots, x^{(0)}(n)]$ represent the data sequence, $X^{(0)}(n) \geq 0, n = 1, 2, \dots, n$ and $X^{(1)}$ represent the first-order accumulation generation sequence of the original data sequence $X^{(0)}$, and its expression is as follows:

$$X^{(1)} = [x^{(1)}(1), x^{(1)}(2), \dots, x^{(1)}(n)]. \quad (2)$$

Let $\mathfrak{F}^{(1)}$ represent the immediate mean generation sequence corresponding to the original data sequence $X^{(0)}$, and its expression is as follows:

$$\begin{cases} \mathfrak{F}^{(1)} = [\mathfrak{F}^{(1)}(1), \mathfrak{F}^{(1)}(2), \dots, \mathfrak{F}^{(1)}(n)] \\ \mathfrak{F}^{(1)}(k) = \frac{x^{(1)}(n) + x^{(1)}(n-1)}{2} \end{cases}, \quad (3)$$

where $n = 2, 3, \dots, n$.

Let Y represent the least square estimation of the grey Verhulst model, and its calculation formula is as follows:

$$Y = [x, y]^T = \frac{B^T}{B}. \quad (4)$$

The effect term of the Verhulst-like model is introduced into the grey Verhulst model to obtain the whitening equation corresponding to the grey GM (1,1) power model and GM (1,1) power model as follows:

$$\begin{cases} X^{(0)}(N) + X^{(1)}(N+1) \geq 0, \\ \frac{dX^{(1)}}{dt} + x^{(1)} = y(x^{(1)})^\delta, \end{cases} \quad (5)$$

When parameter δ has a value of 2, the grey Verhulst model and its corresponding whitening equation are obtained as follows:

$$\begin{cases} x^{(0)}(k) + bx^{(1)}(k) = b(z^{(1)}(k))^2, \\ \frac{dx^{(1)}}{dt} + bx^{(1)} = b(x^{(1)})^2, \end{cases} \quad (6)$$

In the above equation, b represents the ash action and δ represents the development coefficient.

The grey Verhulst model obtains the time response formula by solving the whitening equation:

$$\frac{\hat{x}^{(1)}(N+1) = x^{(1)}(N)}{[x^{(1)}(N) + e^{at}(X - Yx^{(1)}(N))]}, \quad (7)$$

where $N = 1, 2, \dots, n-1$.

Through the above process, the prediction equation of the Grey Verhulst Model is obtained, and the characteristics of the psychological crisis of college students are studied:

$$X^{(0)}(N+1) = X^{(1)}(N+1) - X^{(1)}(N). \quad (8)$$

2.2. Calculation of the Threshold of College Students' Psychological Behavior Tendency. This section is based on the analysis of the characteristics of college students' psychological crisis and the calculation of the threshold of behavior tendency. In the process of modeling the negative psychological crisis of college students, the fusion of constraint

fuzzy theory obtains the essential characteristics of college students' psychology from subjective and objective reasons. Considering the different stages of college students' psychology, the corresponding information entropy of the behavioral obstacles is obtained in each stage of college students' psychology, and the threshold of the behavior tendency of college students is calculated to produce psychology [17, 18]. The process is as follows:

The set $\{Q(t), q = 1, 2, \dots, n\}$ represents the mental time series of different stages of college students. Because of the obvious differences in forms of college students' psychology, it is necessary to reconstruct the psychological process in phase space to obtain a matrix as follows:

$$Q = \begin{bmatrix} q(1) & q(1+\tau) \cdots q(1+(m-1)\tau) \\ q(2) & q(2+\tau) \cdots q(2+(m-1)\tau) \\ \dots & \dots \\ q(n) & q(n+\tau) \cdots q(n+(m-1)\tau) \end{bmatrix}, \quad (9)$$

where ξ represents the psychological complexity of college students, and τ represents the psychological duration, meeting the following requirements:

$$N = (\xi - 1) \cdot \tau. \quad (10)$$

Each row in the matrix is regarded as a variety of influencing factors of psychological changes, and the total number is N . The influencing factors are ranked according to the degree of conflict psychology, and the index of the affected categories of the affected factors in the initial psychological performance state is obtained to obtain the psychological performance state of the affected categories [19–21]. For r dimension college students, the total number of mental state sequences corresponding to different mental states is u , assuming that the probability of the occurrence of different mental state sequences is P_1, P_2, \dots, P_k ; then, the probability of mental state sequences is ranked according to the form of Shannon entropy. The amount of information of a piece of information is directly related to its uncertainty. For example, if we want to figure out something very uncertain or something we do not know, we need to know a lot of information. Shannon entropy can effectively solve the problem of quantitative measurement of information. And the permutation entropy is defined by the following formula:

$$D = - \sum_{j=1}^k (P_j \cdot \ln P_j). \quad (11)$$

The state sequence is integrated given by formula (11), and formula (12) is used to express the behavioral emotional characteristics corresponding to the psychological state at this stage:

$$\frac{0 \leq D = D}{\ln(\xi) \leq 1}. \quad (12)$$

Suppose that $\{x(t), t = 1, 2, \dots, N\}$ represents the time series set of behavioral emotional characteristics of college students' psychological state. Due to the complexity of college students' behavioral tendency dominated by

psychology, it is necessary to establish a relationship with psychological duration τ , select the duration series $x(t + \tau)$ to form a new duration stage point column $y(t)$, and determine the psychological duration according to the correlation between $x(t)$ and $y(t)$.

For the time series X and Y of behavioral propensity dominated by subjective will and objective events at two different stages, according to the performance of university students' psychology in work, life, and study [22], the average information amount of psychological behavior hindered by subjective factors and objective factors is selected from the two different stages, and the threshold of behavioral propensity formed by different reasons is calculated respectively by using formula (13) and formula (14):

$$G(X) = - \sum_{i=1}^n U(x_i) \lg U(x_i), \quad (13)$$

$$G(Y) = - \sum_{i=1}^n U(y_i) \lg U(y_i). \quad (14)$$

Among them, $U(x_i)$ represents the set X of time series of behavioral tendencies dominated by the psychology of college students formed by subjective will, x_i represents the set of characteristic indicators of subjective factors such as emotional fluctuation, weak will, psychological conflict, and ideological extremism extracted, and $U(y_i)$ represents the set Y of time series of behavioral tendencies dominated by the psychology of college students formed by objective events, which is characterized by such objective factors as individualism, pursuit of fame and interests, abuse of power for personal gain, bribery, and parents' emphasis on intellectual education.

2.3. Dynamic Early-Warning Model of College Students' Psychological Negative Crisis. The fuzzy early-warning method based on feature attributes is used to conduct the early warning of psychological crisis of college students [23]. Psychological adaptability, frustration endurance, emotional stability, safe inclination, hedging ability, and temperament are six indicators of college students' early warning of psychological crisis. Based on these six warning indicators, the information of warning indicators is constructed, and the set of warning factors is constructed according to the fuzzy comprehensive warning method and the warning indicator system, which is represented by S [24]. Each index used in college students' early warning of psychological crisis is divided into 5 grades, and the evaluation results of constructing the comment set are divided into excellent, good, medium, poor, and very bad.

In the process of constructing the fuzzy comprehensive evaluation model, weight distribution is a key link. The analytic hierarchy process or the Delphi method are generally selected. The weight distribution can be obtained by the analytic hierarchy process, as shown in formula (4):

$$L = \{L_1, L_2, L_3, L_4, L_5\} = \{0.36, 0.09, 0.14, 0.13, 0.12\}. \quad (15)$$

The membership vectors of all factors are summarized to construct the fuzzy early-warning matrix of S_i (i.e., membership matrix), which can be expressed by E_i . The fuzzy comprehensive evaluation vector of each early-warning index is obtained by using the compound operation process of fuzzy matrix:

$$B_i \cdot B_i = A_i \cdot E_i = (b_{i1}, b_{i2}, b_{i3}, b_{i4}, b_{i5}). \quad (16)$$

It is necessary to construct a scientific subordinate function in the early warning of college students' psychological tolerance. Symptom self-rating scale SCL-90 is the most commonly used mental health test in the world. The national norm of the symptom index is 1.43 ± 0.51 . The mean 1.43 is chosen as the midpoint, and the standard deviation is taken as the interval to construct the corresponding relationship between the early-warning score of college students' mental endurance and the comment set. Comprehensive early warning is to use the index to judge abnormal state of psychology. Based on the correspondence between the mental health standards and the commentary set, the comprehensive early-warning levels are set as excellent (0–0.4), good (0.4–0.92), medium (0.92–1.43), poor (1.43–1.96), and bad (1.96–2.88). At the same time, the measurement scale vector is set to $L = (0.36, 0.09, 0.14, 0.13, 0.12)$. Thus, the mathematical calculation model of college students' psychological crisis index can be determined as follows:

$$\aleph = E \cdot L. \quad (17)$$

Based on the psychological crisis index of college students, the set of subjective and objective psychological factors formed by college students is obtained, the objective function of the relationship between college students' psychology and their behavioral obstacles is given, and the problem model of college students' psychological negative crisis is established.

The set of all factors is set for college students to have the tendency of rebellious behavior dominated by psychology as follows:

$$\Phi = \{\varphi_1, \varphi_2, \dots, \varphi_n\}. \quad (18)$$

The objective function of the relationship between college students' psychology and their behavioral obstacles is obtained as follows:

$$Z = \Phi \cdot \sum_{k=1}^n \sum_{i=1}^n \varphi_n \cdot d_{ik}^2, \quad (19)$$

where $d_{ik} = \|x_k - v_i\|$ represents the correlation strength between each resistance factor x_k and the category v_i of rebellious behavior tendency. Based on the evaluation function φ_n of psychological negative crisis relationship obtained by the above formula, the global optimal solution is solved by the following formula:

$$F = \frac{\sum_{n=1}^k (\varphi_n \cdot x_n)^m}{\sum_{n=1}^k \varphi_n}. \quad (20)$$

2.4. Model Solving Based on Ant Colony Algorithm. The ant theory is used to solve the model in the above section, thus effectively solving the negative psychological crisis model of college students. The ant colony algorithm is a probabilistic algorithm used to find optimal paths. The algorithm uses a positive feedback mechanism to make the search process converge continuously and finally approach the optimal solution. Therefore, this algorithm was selected in the model solving. The specific process is as follows: suppose that λ represents the intensity of hindrance behavior tendency of college students in t period, Δv represents the pheromone of negative psychological crisis of college students searched by ant k , and $f(0 \leq f \leq 1)$ represents the influence of negative psychological crisis, and the intensity of hindrance behavior tendency of college students in the next period searched is calculated by using the formula below:

$$\lambda(t+1) = f \cdot \lambda(t) + \sum \Delta\lambda_{ij}(t). \quad (21)$$

Assuming that d_k represents the path length traveled by the k ant in this cycle, there are

$$\frac{\Delta\lambda(t) = d}{\lambda(t+1)}. \quad (22)$$

Assuming that η_{ij} represents the visibility of path (i, j) , usually taken as $1/d_{ij}$, set d_{ij} represents the length of path (i, j) , the importance corresponding to path visibility is $\beta(\beta \geq 0)$, the relative importance of path trajectory is $\alpha(\alpha \geq 0)$, U represents the feasible point set, and the transition probability of ant k in t -time domain is $p_{ij,k}(t)$, then $p_{ij,k}(t)$ is defined by the following formula:

$$p_{ij,k}(t) = \begin{cases} \frac{[\Delta\lambda(t)] [\eta_{ij}]^\beta}{\sum_{l \in \eta_{ij}} [\Delta\lambda(t)] l [\eta_{ij}]^\beta}, & j \in \eta_{ij}, \\ 0, & j \notin \eta_{ij}. \end{cases} \quad (23)$$

According to the above description, the optimization function of college students' psychological negative crisis model is calculated by using formula (20):

$$\min Z = f(x) \cdot x \in [a, b]. \quad (24)$$

Suppose m ant is at the equal division of interval m in the initial time domain, λ_{ij} is replaced in formula (19) with λ_j , which is called the neighborhood attraction intensity of ant j , and η_{ij} is defined as $f_i - f_j$, which represents the difference value of objective function and parameter $\alpha, \beta \in [1, 5]$ of college students' psychological negative crisis model. The transfer probability of ants is calculated by the following formula:

$$p_{ij} = \left(\frac{[\lambda_j] [\eta_{ij}]^\beta}{[\eta_{ik}]^\beta} \right). \quad (25)$$

The negative psychological crisis model of college students is established by using the following formula:

$$\lambda_j(t+1) = \frac{\lambda_j(t) + \sum_j \Delta\lambda_j}{\rho}, \quad (26)$$

where $\Delta\lambda_j$ represents the increase of the regional attraction intensity of the j -th ant in this cycle, L_j represents the change of $f(X)$ in this cycle, which is defined as $f(X+r) - f(X)$. The optimization of the function is carried out with the help of the continuous movement of m ants. When $\eta_{ij} \geq 0$ is satisfied, ant i transfers from its nearest neighborhood i to the neighborhood of ant j according to probability p_{ij} ; when $\eta_{ij} \leq 0$ is satisfied, ant i searches the nearest neighborhood. The search radius is r , that is, each ant either moves to the location of other ants or carries out near neighborhood search and gradually converges to the global optimal solution of the problem.

3. Pyramid Relationship Analysis of College Students' Psychological Crisis Prevention and Intervention

People are products of relationships. The psychological crisis of college students inevitably affects a series of interpersonal relationships. Generally speaking, in the psychological crisis incidents of university students, the individuality of psychological crisis is the student himself, and there are many closely related individuals of psychological crisis based on the individual of psychological crisis, including parents and relatives (dependants, guardians), school teachers and students, staff of government departments, staff of social institutions, and concerned people [25–27]. These related individuals of psychological crisis constitute a huge network of psychological crisis relations. The tight pyramid model of the relationships between and with these crisis-associated individuals is shown in Figure 1, where schools, families, government, and society all have relationships of equal importance to the crisis-associated individuals [28, 29]. However, in the prevention and intervention of college students' psychological crisis in the past, people often pay too much attention to the relationship between schools and individuals in psychological crisis. It can get twice the result with half the effort when we intervene in college students' psychological crisis according to the tight relationship and straighten out all the relationship networks [30–32].

It is the common pursuit and goal of the government, the university, the society, the family, and even the individual students who meet the psychological crisis to make full use of the pyramid model to prevent and intervene the psychological crisis of college students [33]. Although the pyramid model of psychological crisis of college students can achieve the characteristics of abstraction, prominence, and systematic linkage [34–36]; in order to reduce losses, avoid risks, and improve efficiency, it is necessary to carry out advance education and rehearsal of psychological crisis of college students for key groups closely related to psychological crisis.

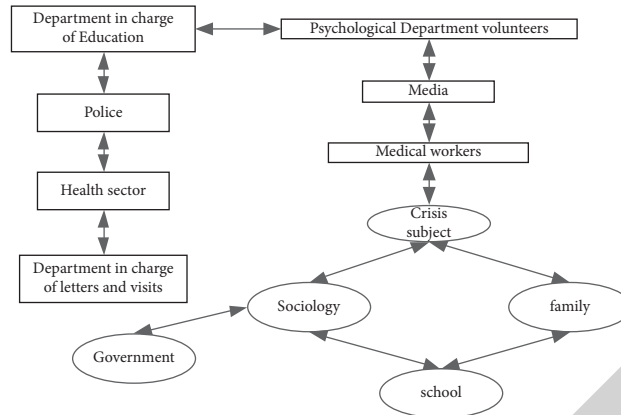


FIGURE 1: Pyramid relationship model of college students' psychological crisis intervention.

4. Experimental Design and Result Analysis

In order to verify the effect of the dynamic early-warning model of college students' psychological crisis based on perceptual data, this paper selects 4,200 college students as the object of study and uses this model to test the dynamic early-warning of college students' psychological crisis.

4.1. Cluster Mining of Abnormal Mental State. This model is used to mine clusters with an abnormal psychological state in all the selected research objects. Figure 2 shows the mining results of some research objects.

From Figure 2, the results of mining the mental state of some research objects using this model are completely consistent with the actual mental state of the research objects. This shows that the model in this paper can accurately dig out clusters of college students with abnormal mental states from all the research objects. This article uses the Verhulst predictive model to analyze the characteristics of college students' psychological crisis. In the process of research object mining, it can be accurately classified according to characteristic attributes. Early warning of psychological crisis for the excavated clusters can improve the early-warning efficiency of this model.

4.2. Psychological Crisis Early-Warning Results. Based on the abnormal psychological state of college students' cluster discovered in the previous experiment, this paper uses the method of six indicators such as psychological adaptability, frustration tolerance, emotional stability, security tendency, hedging ability, and temperament to warn the subjects of the abnormal psychological state cluster of a mental crisis and determines the trend of the overall psychological state of the subjects according to the summary of various indicators. Some results are shown in Tables 1–3.

Analysis Tables 1–3 can be obtained; most of the selected study subjects are at the medium level of psychological crisis ability; a very few of the study subjects are poor or very poor in psychological crisis ability, so it is necessary to adopt different measures through the relevant teachers to carry out psychological health education and psychological counseling. The method in

this paper obtains the essential causes of college students' psychological crisis according to the theory of constraint fuzzy theory and can accurately classify the psychological state of students according to the index of psychological crisis of students. According to the results of the threshold value of students' mental behavior tendency calculated in this paper, the emotional stability and frustration tolerance of students can be accurately identified. Based on the above data, the analysis of the overall mental crisis ability of college students can help colleges and universities to grasp the direction of mental health education.

4.3. Comparative Test. Taking 4,200 students in a university as the research object, the comparative test data comes from about 4,500 original records of student mental health assessment in the past two years. Then, the original data are preprocessed according to the threshold of psychological behavior tendency, and the result of psychological crisis early warning is taken as a reference. The grey correlation degree, small error probability, and mean square deviation of the psychological crisis early-warning results of the method of this paper, the method of reference [4], and the method of reference [5] are calculated through the test platform.

4.3.1. Comparative Test of Grey Correlation Degree, Small Error Probability, and Mean Square Deviation Ratio. In order to verify the overall effectiveness of the proposed method, the proposed method is tested in the TTE network platform developed by visual c++. Taking grey correlation degree γ , small error probability P , and mean square deviation ratio C as test indexes, the proposed method, literature [4] method, and literature [5] method are tested. The calculation formulas of test indexes are as follows:

$$\gamma = \frac{1}{n} \sum_{k=1}^n \delta(k),$$

$$P = P\left\{|\Delta^{(0)}(k) - \bar{\Delta}^{(0)}| < 0.6745S_1\right\}, \quad (27)$$

$$C = \frac{S_2}{S_1},$$

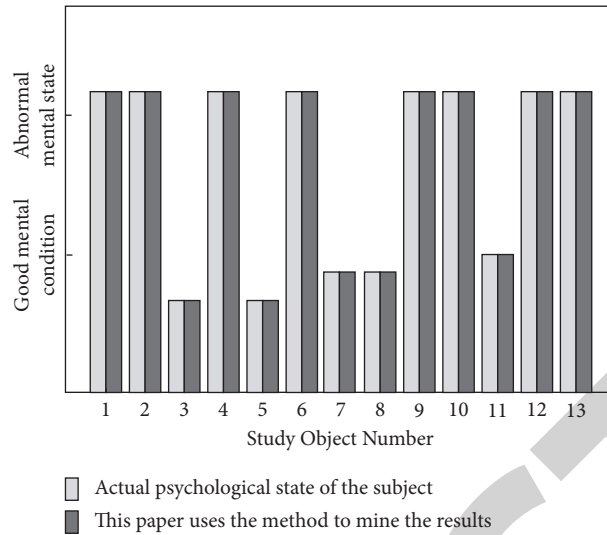


FIGURE 2: Mining results of some research objects.

TABLE 1: Test results of six indicators of college students.

Index psychological adaptability	Student number			
	1	2	3	4
Frustration tolerance	90	95	74	64
Emotional stability	92	86	83	98
Safety tendency	95	98	86	83
Hedging ability	97	98	92	77
Index	88	90	98	62

TABLE 2: Emotional stability test results.

Gender	Male	Female	Total
Excellent (number)	146	56	180
Good (number)	198	80	258
Medium (number)	1,189	558	1,790
Poor (number of people)	116	69	182
Poor (number of people)	5	56	11

TABLE 3: Test results of frustration tolerance.

Gender	Male	Female	Total
Excellent (number)	245	58	170
Good (number)	88	82	181
Medium (number)	1,546	492	1,888
Poor (number of people)	125	115	219
Poor (number of people)	25	20	49

where $\delta(k)$ represents the correlation coefficient; $\Delta^{(0)}(k)$ represents absolute error sequence; $\bar{\Delta}^{(0)}$ is the mean value corresponding to $\Delta^{(0)}(k)$; S_2 is the variance corresponding to $\Delta^{(0)}(k)$.

Figure 3 shows the grey correlation test results of the proposed method, literature [13] model, and literature [14] model. The higher the grey correlation, the more accurate the change of college students' psychological crisis

characteristic attributes analyzed by the method. By analyzing the data in Figure 3, it can be seen that the grey correlation of the score analysis results obtained by the proposed method in multiple iterations is higher than that of the other two methods.

Figure 4 shows the small error probability of different methods. The smaller the small error probability, the greater the error of the result of the characteristic attribute analysis

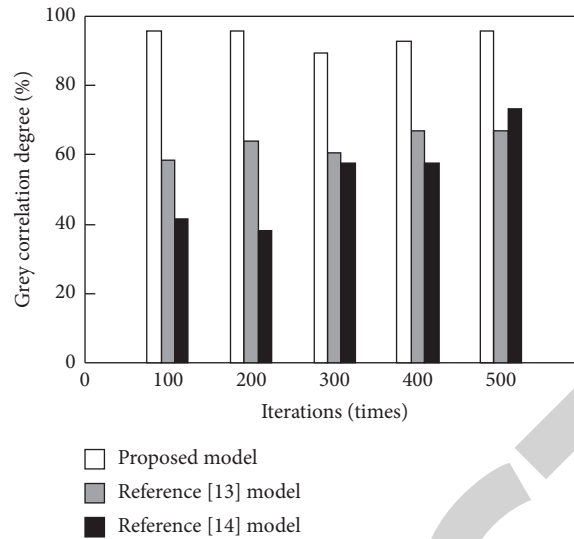


FIGURE 3: Grey correlation degree of different models.

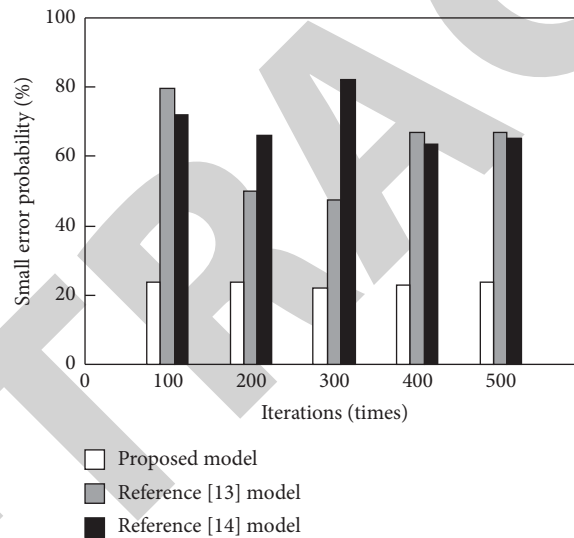


FIGURE 4: Small error probability of different models.

of the method in the evolution process of college students' psychological crisis. It can be seen from Figure 4 that the small error probability of the analysis results obtained by the literature [13] model and the literature [14] model is lower than the small error probability of the analysis results of the proposed method.

Figure 5 shows the mean square deviation ratio obtained by different methods in multiple iterations. The larger the mean square deviation ratio, the greater the error of the analysis results. The mean square deviation ratio obtained by the proposed method in multiple iterations is within 0.02, which is far lower than the mean square deviation ratio of the methods in literature [4] and literature [5]. The method in this paper constructs a fuzzy comprehensive early-warning model of characteristic attributes after obtaining the information of the mental state of college students. The determination of early-warning indicators helps to predict the psychological crisis of college students in time.

Therefore, the method in this paper has great advantages in the test of grey correlation degree, probability of small error and mean square error, and other indicators.

4.3.2. Comparison of Early-Warning Accuracy of Psychological Crisis Model. The early-warning accuracy of this model and the two comparison models is compared, and the results are shown in Figure 6.

According to the analysis of Figure 6, among the early-warning results of the three early-warning models on the psychological crisis of the research object, the early-warning results of this model completely coincide with the fitting curve of the actual situation. Because this article sets early-warning indicators, it obtains information on the early-warning indicators of college students' psychological crisis. And according to the fuzzy comprehensive early-warning method and the early-warning index system, the early-

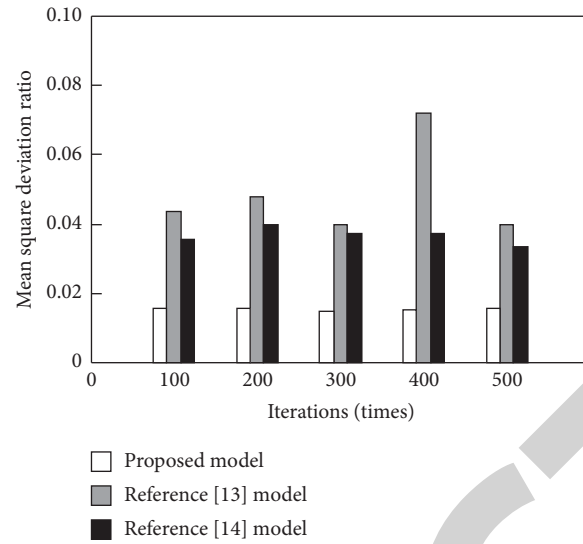


FIGURE 5: Mean square deviation ratio of different models.

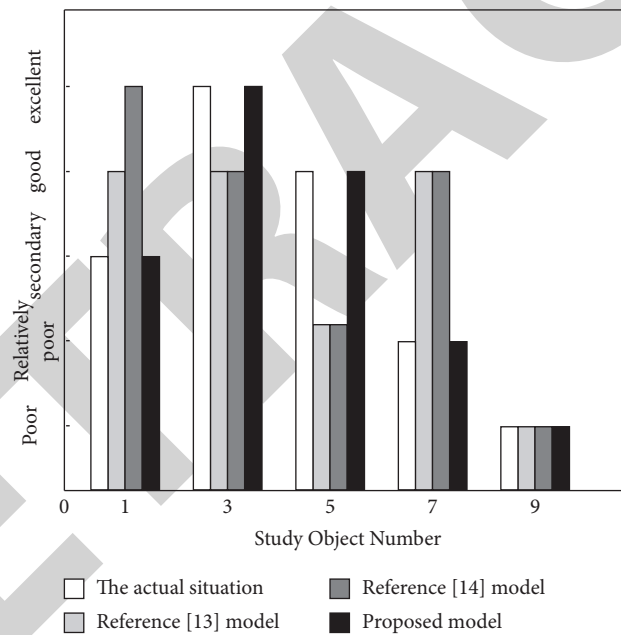


FIGURE 6: Comparison of early-warning results of different models.

warning factor set of college students' psychological crisis is constructed, thereby improving the accuracy of psychological crisis early warning of the method in this paper, which shows that the early-warning accuracy of this model is significantly higher than that of the other two early-warning models.

4.3.3. Complexity Comparison of Psychological Crisis Early-Warning Models. Early-warning efficiency is an important test direction of the college students' psychological crisis early-warning model. Figure 7 shows the comparison results of early-warning efficiency between this model and the

comparison model, in which the early-warning efficiency is reflected by the index complexity in early warning.

It can be seen from Figure 7 that among the three early-warning models, the index complexity of the model in this paper is controlled below 20%, which is significantly reduced compared with the two comparative models. This is because before constructing the dynamic early-warning model of psychological crisis, this article analyzes the psychology of students at different stages in advance and calculates the threshold of psychological behavior tendency based on the behavior information entropy. These processes process psychological data in advance and simplify the process of dynamic early warning of psychological crises. Therefore, it

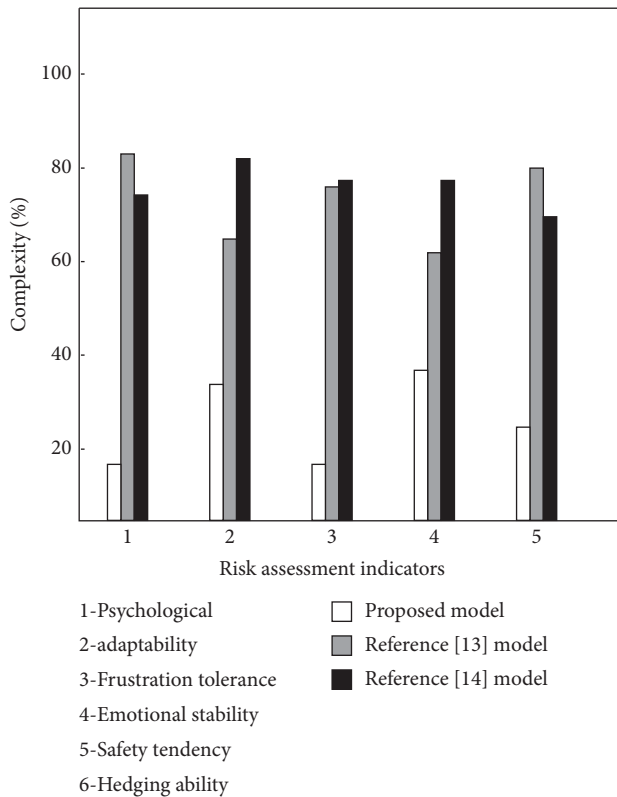


FIGURE 7: Comparison of early-warning results of different models.

shows that the early-warning indicators used in this model are relatively simple and conducive to the improvement of early-warning efficiency.

5. Conclusion

Psychological crisis intervention is the most important link to relieve the psychological pressure of college students and avoid mental illness. Therefore, it is important to understand the psychological state of college students in time and predict the psychological crisis as early as possible. In order to solve the problem of large error in the traditional early-warning model of college students' psychological crisis, this paper introduces the grey Verhulst method to analyze the characteristics of college students' psychological crisis, constructs the dynamic early-warning model of college students' psychological crisis, calculates the threshold value of psychological behavior tendency, perceives the information of college students' psychological state, sets the warning index, and realizes the dynamic warning of college students' psychological crisis. And the early-warning accuracy of the method in this paper is higher than the comparison of the two methods, which is consistent with the actual situation. Because the method in this paper preprocesses the psychological data and optimizes the calculation process, the computational complexity of the model is also low. The above experimental results prove that the constructed model has better performance in early warning of college students' psychological crisis. This article has achieved the purpose of predicting the psychological crisis of

students more accurately. The data selected this time are conventional student data information, and the actual types of psychological crisis attributes are far more than these. In future research, we consider adding data on student internships, work, and other attributes to improve the prediction range of the model.

Data Availability

The raw data used to support the conclusions of this article are available from the corresponding author upon request without undue reservation.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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