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Using Fuzzy Comprehensive Evaluation Method to Assess the Implementation Effect of College Students' Mental Health Education in the New Media Environment

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ABSTRACT

This paper constructs a comprehensive evaluation system based on the CIPP model, covering multiple dimensions such as input evaluation and outcome evaluation, in order to comprehensively measure the effect of college students' mental health education in the new media environment. In terms of weight determination, the subjective weights are obtained by hierarchical analysis method, then the objective weights of each index are calculated by entropy value method based on the actual data, and then the combination assignment method is used to organically combine the subjective and objective weights to obtain the final indexes. The relationship matrix was constructed on the basis of a large amount of collected data, and the fuzzy comprehensive evaluation method was used to comprehensively assess the implementation effect of college students' mental health education. The results of the study show that the overall level of the effect of college students' mental health education is good, with the ratings of 79.54 and 78.28 for their mental health knowledge and ideological awareness evaluation, respectively, and that the mastery of mental health methodology and the awareness of proactively seeking psychological help are the main factors affecting the mental health of college students. In addition, the mastery level of college students' mental health practice ability is average (69.52), and there is an obvious deficiency in their theory to practice, which also adds difficulty to the construction of college students' mental health. Therefore, the fuzzy comprehensive evaluation method can be used to optimize the evaluation system of college students' mental health education in the new media environment.

Keywords: Hierarchical Analysis, Entropy Value Method, CIPP Model, Fuzzy Comprehensive Evaluation, Mental Health of Students

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1. Introduction

The rapid development of new media provides a broader and more convenient communication channel for college students' mental health education. As one of the main channels of information dissemination, new media has penetrated into the daily life of college students, influencing their ideology, emotional experience, and behavioral habits [1-3]. Through new media channels, mental health education can directly reach the majority of college student groups, convey positive mental health concepts, and help them better recognize and manage their mental health problems [4-5]. College students' mental health education in the new media environment also faces new challenges and opportunities. Traditional education methods can no longer meet the diverse and personalized mental health needs of college students, and more accurate and personalized education content needs to be provided through new media channels [6-7]. New media platforms are rich and diverse, and the amount of information that college students are exposed to is increasingly large and complex, facing problems such as information overload, undesirable information, false information, etc., which may lead to the emergence of mental health problems among college students [8-9]. New media also bring new sources of psychological stress, such as cyber violence, cyber bullying, cyber dependence, etc., which also have a certain impact on college students' mental health [10-12]. In the new media era, college students are generally addicted to cell phones, depression and anxiety, which brings greater challenges to mental health education [13-14]. Under the new media environment, it is of great significance and value to strengthen the mental health education of college students, to better meet the mental health needs of college students and to promote their healthy growth with the power of new media. Mental health education is getting more and more attention in college students' groups, but how effective its implementation is has been a matter of great concern.

Literature [15] proposed a program of mental health literacy education and evaluated the implementation effect of the program through questionnaire method, and found that students' desire to seek psychological knowledge, willingness to treat, and provide psychological help increased significantly. Literature [16] evaluated a mental health simulation training program through a scenario-based simulation experiment with questionnaires to collect changes in students before and after the program, and found that the program did have an effect on students' professional knowledge, ability to cope with the situation, and confidence in providing psychological help. Literature [17] collected data on knowledge, skills, and attitudes of nurse midwives under two perinatal mental health education courses and evaluated them by SPSS analysis and showed that the revised course was effective. Literature [18] assessed the mental health cognitive ability, willingness to seek help, and attitude to seek help of youth under online psychoeducation under a randomized controlled trial, and the analysis of data collected from the trial showed that this online psychoeducation did improve self-identification of psychological problems and willingness to seek help. In addition, from the perspective of multi-attribute group decision-making, literature [19], literature [20], and literature [21] evaluated college students' mental health education using the hesitant triangular fuzzy information tool, binary linguistic neutral number MAGDM method, and single-valued neutrosophic sex set tool, respectively, and all three evaluation methods had good performance. Among them, the single-valued neutrophilic sex set tool is relatively more complex and is not a single evaluation, and the second is a more in-depth analysis of the quality of the education of the course after the data analysis of the cases involved in the evaluation and then the comparison of some of the indicators. Currently, there are very few evaluation studies on mental health education or training, and traditionally most of them use self-reporting, interviews, and observation. More scientific methods and tools have been added in recent years, but these studies have emphasized more on the practicality of their own methods and have not provided more detailed evaluations. Due to the huge content of the evaluation of the effectiveness of mental health education, it is difficult to synthesize these methods to evaluate the effectiveness of education.

So there is a need to develop a new evaluation method to solve this kind of problem and better assist the teaching of mental health education.

In this paper, firstly, through literature research and expert consultation, an evaluation index system with 4 first-level dimensions and 13 second-level dimensions including background evaluation and input evaluation etc. is determined. Hierarchical analysis and entropy value method were used to determine the subjective weights of each index while calculating their objective weights, and then the combination assignment method was used to calculate the subjective and objective weights to obtain the final weight vector. After that, take J school as an example, collect the data related to college students' mental health education to construct a fuzzy relationship matrix, and utilize the fuzzy comprehensive evaluation method to evaluate the implementation effect of college students' mental health education in the new media environment.

2. Construction of a mental health education evaluation system based on fuzzy comprehensive evaluation

2.1. Construction of evaluation system for college students' mental health education

In order to more scientifically formulate the evaluation indexes under the CIPP evaluation system, this study tries to construct a more scientific evaluation system for mental health education programs in colleges and universities on the basis of synthesizing the construction of a large number of college and university mental health program systems. It is specifically divided into four first-level indicators, namely, background evaluation, input evaluation, process evaluation and result evaluation, and 13 second-level indicators, such as system construction, institutional setup, faculty construction and teaching organization. The first and second level indicators are assigned weight points, and the weight value of each indicator is from 0 to 1. The sum of the weights of all the first level indicators is 1, the sum of the weights of all the second level indicators under the guidance of the first level indicators is 1, and the sum of the weights of all the third level indicators under the guidance of the second level indicators is 1. The evaluation system of college students' mental health education is shown in Table 1.

Table 1. College students' mental health education evaluation system

Primary indicator	Secondary indicator
Background evaluation	Institutional setting
	Institutional construction
	Course setting
	Campus culture construction
Input evaluation	Staff building
	Teaching quality
	Textbook target
	Material content
Process evaluation	Teaching group
	Teacher teaching
Result evaluation	Teaching management
	Academic performance
	Teaching satisfaction

2.2. Selection of methodology for calculating indicator weights

2.2.1. Principles of Hierarchical Analysis:

1) Modeling the ladder hierarchy. A hierarchical model containing a goal layer, a criterion layer and a

solution layer is constructed [22]. The goal layer is located at the highest level in the hierarchy and represents the final problem to be solved or goal to be achieved, with only one element. This is followed by the criterion layer, which contains multiple criteria or indicators used to solve the problem or achieve the goal. The solution layer is located at the lowest level and evaluates the weight and importance of the comparative criterion layer to determine a feasible decision-making solution.

2) Constructing judgment matrix. Based on the ladder hierarchy model, the affiliation between the upper and lower indicators is clarified, and the judgment matrix between the indicators is further constructed through expert scoring:

$$A = (a_{ij})_{n\times n} \tag{1}$$

Where i, j is the indicator element in the guideline layer and a_{ij} is the ratio of the importance index between two corresponding indicators. The expert scoring rules are based on Saaty's 1-9 scale. The judgment matrix 1-9 scale is shown in Table 2.

Table 2. Judgment matrix 1-9

Scale	Mean
1	The two elements are equally important
3	The former is slightly more important than the latter
5	The former is more important than the latter
7	The former is more important than the latter
9	The former is more important than the latter
2,4, 6,8	The middle value of the above adjacent judgment
Reciprocal	If the importance of the element i and element j is a_{ij} ,the importance of the element j and element i is a_{ij} =1/ a_{ij}

3) Calculate the weight vector. The “sum method” is used to calculate the arithmetic mean between the index ratios of the importance of talent evaluation indicators, and then calculate the weight of each indicator w_i and the largest characteristic root of each judgment matrix $\lambda_{\max}$:

$$\lambda_{\max} = \frac{1}{n}\sum_{i=1}^{n}\frac{(AW)_i}{w_i} \tag{2}$$

4) Consistency test. The consistency index CI is calculated to avoid logical errors in the judgment matrix, and the formula is as follows:

$$CI = \frac{\lambda_{\max} - n}{n-1} \tag{3}$$

Where n is the judgment matrix order. If $\lambda_{\max} = n$, i.e., $CI = 0$, it indicates that the judgment matrix has full consistency; if $\lambda_{\max} > n$, it is necessary to further measure CI the size, and the larger its value indicates that the two-by-two comparison results are less reliable. For this reason, the average random consistency index RI is introduced to calculate the consistency ratio CR:

$$CR = \frac{CI}{RI} \tag{4}$$

The value of RI in the above equation is derived from the corresponding matrix order standard table, $CR < 0.1$ indicates that the matrix consistency is more desirable, otherwise that is, it does not pass the consistency test, and the matrix needs to be appropriately corrected.

2.2.2. Principles of the entropy method. Using the entropy value method [23] to calculate the weight size of each evaluation index X_j specific steps are described below, m represents the number of

evaluation objects, n represents the number of evaluation index items, $X_{ij}(1 \le i \le m, 1 \le j \le n)$ represents the index value, $X = (X_{ij})_{m \times n}$ represents the original index data matrix.

1) Indicator standardization processing. For positive evaluation indicators, the larger the indicator value, the better the evaluation results; for negative evaluation indicators, the evaluation results are the opposite. In order to eliminate the influence of the different physical meanings of the indicators due to the possible differences in the scale, as well as to ensure the comparability of the indicators, it is necessary to carry out the standardization process first:

$$X_{ij}^{'} = \frac{X_{ij} - MIN(X_j)}{MAX(X_j) - MIN(X_j)} \tag{5}$$

$$X_{ij}^{'} = \frac{MAX(X_j) - X_{ij}}{MAX(X_j) - MIN(X_j)} \tag{6}$$

Where $X_{ij}^{'}$ represents the standardized value of the i rd evaluation object under the j nd indicator, with a value ranging from 0 to 1. $MAX(X_j)$ and $MIN(X_j)$ represent the maximum and minimum values in the j th indicator, respectively. Equation (5) is used to calculate positive indicators, and equation (6) is used to calculate negative indicators.

2) Calculate the proportion of the i th evaluation object under the j th indicator Y_{ij}:

$$Y_{ij} = \frac{X_{xj}^{'}}{\sum_{i=1}^{n} X_{xj}^{'}} \tag{7}$$

3) Calculate the entropy e_j of the j st indicator:

$$e_j = -\frac{1}{\ln m} \sum_{i=1}^{m} Y_{ij} \ln Y_{ij} \tag{8}$$

4) Calculate the entropy redundancy d_j:

$$d_j = 1 - e_j \tag{9}$$

5) Calculate the objective weight of each indicator based on the redundancy of entropy w_j:

$$w_j = \frac{d_j}{\sum_{j=1}^{n} d_j} \tag{10}$$

2.2.3. Principles of Combinatorial Assignment Methods. Synthesize the subjective weights calculated by the cascade analysis method and the objective weights calculated by the entropy value method, and further assign weights to the indicators by drawing on the formula of combinatorial assignment [24] in existing studies:

$$W_t = \frac{w_i w_j}{\sum_{j=1}^{n} w_i w_j} \tag{11}$$

2.3. Construction of fuzzy comprehensive evaluation model

2.3.1. Determination of the set of evaluation indicators and rubrics. There are 13 evaluation indexes, namely, “institutional setup, institutional construction, curriculum development, campus culture construction, faculty development, teaching quality, teaching materials objectives, teaching materials

content, teaching organization, teachers' teaching, teaching management, teaching and research effectiveness, and teaching satisfaction", which are recorded as u1-u13 respectively.

According to the relevant literature research and actual research to establish the corresponding rubric set V = {v1,v2,v3,v4,v5} = {excellent, good, medium, average, poor}.

2.3.2 Establishment of a fuzzy relationship matrix:

1) Scoring by experts. The evaluation indicators selected in this paper are all qualitative indicators, which are scored by an expert group with relevant experience. A single-factor evaluation is made for each rubric in the rubric set respectively, so that the fuzzy evaluation matrix [25]R can be obtained:

$$R_k = \begin{bmatrix} R_k / C_{k1} \\ R_k / C_{k2} \\ \vdots \\ R_k / C_{kt} \end{bmatrix} = \begin{bmatrix} r_{11}^k & r_{12}^k & \cdots & r_{1p}^k \\ r_{21}^k & r_{22}^k & \cdots & r_{2p}^k \\ \vdots & \vdots & \ddots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ r_{t1}^k & r_{t2}^k & \cdots & r_{tp}^k \end{bmatrix} \tag{12}$$

where $r_{ij}^k (k = 1,2.....n; i = 1,2.....t; j = 1,2.....p)$ indicates the degree of affiliation of the i rd indicator in the k nd factor to the level j rubric.

For qualitative indicators, the magnitude of the likelihood of belonging to the level j rubric is the proportion of the indicator receiving the Vi rubric. The formula is as follows:

$$r_{ij} = S_{ij} / N \tag{13}$$

Where S_{ij} indicates the number of indicators that are considered to belong to level j rubrics; N indicates the number of experts involved in scoring.

2) First-level fuzzy comprehensive evaluation. After obtaining the fuzzy evaluation matrix of each indicator through the expert scoring method, it is synthesized with the corresponding weight vector. Get the affiliation vector D_k of the criterion layer factor A_k to the rubric level domain V, and the first-level fuzzy comprehensive evaluation model is:

$$\begin{aligned} \omega_k \cdot R_k &= (\omega_{k_1}, \omega_{k_2} .....\omega_{k_t}) \cdot \begin{bmatrix} r_{11}^k & r_{12}^k & \cdots & r_{1p}^k \\ r_{21}^k & r_{22}^k & \cdots & r_{2p}^k \\ \vdots & \vdots & \ddots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ r_{t1}^k & r_{t2}^k & \cdots & r_{tp}^k \end{bmatrix} \\ &= (d_{k_1}, d_{k_2} .....d_{k_t}) \square D_k \end{aligned} \tag{14}$$

3) Second-level fuzzy comprehensive evaluation. The affiliation matrix at the criterion level is the indicator affiliation vector obtained from the first-level fuzzy comprehensive evaluation:

$$\tilde{R} = \begin{bmatrix} D_1 \\ D_2 \\ \vdots \\ D_n \end{bmatrix} = \begin{bmatrix} d_{11} & d_{12} & \cdots & d_{1p} \\ d_{21} & d_{22} & \cdots & d_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ d_{n1} & d_{n2} & \cdots & d_{np} \end{bmatrix} = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1p} \\ r_{21} & r_{22} & \cdots & r_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{np} \end{bmatrix} \tag{15}$$

The affiliation vector D of the evaluation object P for the rubric level domain V is obtained by synthesizing the criterion layer vector W with $\tilde{R}$. The second level fuzzy comprehensive evaluation model is:

$$W \cdot \tilde{R} = (\omega_1, \omega_2 \ldots\ldots \omega_n) \cdot \begin{bmatrix} r_{11} & r_{12} & \ldots\ldots & r_{1p} \\ r_{21} & r_{22} & \ldots\ldots & r_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ \vdots & \vdots & \ddots & \vdots \\ r_{n1} & r_{n2} & \ldots\ldots & r_{np} \end{bmatrix} = (d_1, d_2 \ldots\ldots d_n) = D \tag{16}$$

4) Analysis of evaluation results. Follow the principle of maximum affiliation to analyze the results of the fuzzy comprehensive evaluation model, and the final evaluation result is the evaluation grade corresponding to the largest vector in the evaluation result.

3. Analysis of the effect of the implementation of mental health education for university students in the new media environment

3.1. Establishment of weights for portfolio assignment

3.1.1. Hierarchical Analysis Empowerment. Hierarchical analysis is the process of dividing the decision object into multiple levels, forming a "pyramid"-like multilayered structural model in which the elements at the top of the tower control the elements at the bottom, starting at the tip. Based on the end goal, the decision maker scores the impact of the indicators to determine the level of importance of each indicator. The main processes are: construction of hierarchical structure model, construction of decision matrix, single sequence and consistency test, hierarchical total sequence and consistency test.

1) Construction of hierarchical structure model. The evaluation system of college students' mental health education serves as the highest level, which is the target level. Background evaluation, input evaluation, process evaluation and result evaluation serve as the first level indicators, which is the guideline layer. The lowest level is the program level, including 13 secondary indicators, including "system setting, system construction, curriculum, campus culture construction, faculty development, teaching quality, textbook objectives, textbook content, teaching organization, faculty teaching, teaching management, teaching and research effectiveness, and teaching satisfaction".

2) Constructing judgment matrix. The background evaluation, input evaluation, process evaluation and result evaluation of the secondary indicators under the evaluation of college students' mental health education are used as examples to construct judgment matrices. The judgment matrix for comparing the relative importance of the secondary indicators is shown in Table 3.

Table 3. The judgment matrix of the relative importance of the secondary index

Matrix A	A1 Background evaluation	A2 Input evaluation	A3 Process evaluation	A4 Result evaluation
A1 Background evaluation	4	1	2	4/3
A2 Input evaluation	4	1	1/2	3/4
A3 Process evaluation	2	2	1	2/3
A4 Result evaluation	3	1	2/3	1

The weights of the index were obtained by performing a multinomial operation on each of the other factors and averaging the comprehensive scores of each professional. After synthesizing and analyzing, the weights of each index of the hierarchical analysis method are shown in Table 4. From the table, it

can be seen that among the first-level indexes, the background evaluation occupies the largest weight, followed by input evaluation and result evaluation, while the process evaluation occupies the least weight; the weights occupied by the four first-level indexes are 0.3102, 0.308, 0.2394, and 0.1424, respectively.The top five indexes occupying the largest weight among the second-level indexes are system construction, teaching quality, teaching and research effectiveness, teaching The top 5 indicators in the secondary indicators are system construction, teaching quality, teaching and research effectiveness, teaching organization and teaching material content, with weights of 0.1661, 0.1306, 0.1124, 0.1107 and 0.1094 respectively, and the weights of the rest of the indicators are all less than 0.1.

Table 4. The hierarchy process is weighted by each index

Primary indicator	Global weight	Secondary indicator	Global weight
Background evaluation	0.3102	Institutional setting	0.0581
		Institutional construction	0.1661
		Course setting	0.0717
		Campus culture construction	0.0143
Input evaluation	0.308	Staff building	0.0124
		Teaching quality	0.1306
		Textbook target	0.0556
		Material content	0.1094
Process evaluation	0.1424	Teaching group	0.1107
		Teacher teaching	0.0317
Result evaluation	0.2394	Teaching management	0.0425
		Academic performance	0.1124
		Teaching satisfaction	0.0845

3.1.2. Entropy weight method of empowerment. The entropy weight method starts from the index itself, through the comprehensive processing of the data of each index item in the evaluation. The main application process is as follows: standardize the original evaluation data obtained, and then adjust the proportion of information entropy and utility value by weighting the information entropy and utility value obtained to determine the entropy weight, in order to obtain a more objective weight. The weight of each index entropy weight method is shown in Table 5. The weights occupied by the four first-level indicators are, in descending order, input evaluation > outcome evaluation > background evaluation > process evaluation, and their corresponding weights are 0.3442, 0.2641, 0.2507, and 0.141; among the second-level indicators, the weights occupied by educational quality, effectiveness of teaching and research, system construction, organization of teaching, pedagogical satisfaction, and content of teaching materials are, in descending order, 0.1043 -0.1353, and the weights of the remaining indicators are all less than 0.1. It can be seen that the biggest advantage of entropy weighting method is that it can ensure the correct processing of data by weighting the information provided by the decision matrix while avoiding subjective judgment. In the data decision-making, it can be seen that the mental health of college students comes from the educational evaluation background of the university, the evaluation of the input of teaching, the evaluation of the results of the teaching output, and the evaluation of the teaching process.

Table 5. The weight of each indicator entropy

Primary indicator	Global weight	Secondary indicator	Global weight
Background evaluation	0.2507	Institutional setting	0.0629
		Institutional construction	0.12

		Course setting	0.0615
		Campus culture construction	0.0063
Input evaluation	0.3442	Staff building	0.0376
		Teaching quality	0.1353
		Textbook target	0.067
		Material content	0.1043
Process evaluation	0.141	Teaching group	0.1183
		Teacher teaching	0.0227
Result evaluation	0.2641	Teaching management	0.0355
		Academic performance	0.1208
		Teaching satisfaction	0.1078

3.1.3. Combined empowerment. Utilizing game theory to study the coordinating role of subjective and objective assignment methods in conflict, seeking the maximum benefit of both, while taking into account the subjective and objective trade-offs, the interrelationships of each indicator are fully considered, subjective bias is reduced and the scientific nature of the assignment is enhanced. The specific implementation of this indicator has the following ways: adopt AHP and entropy value method to assign subjective and objective weights to the indicators, take Nash equilibrium as the synergistic goal, seek the similarity and compromise of various weights, that is to say, seek to minimize the deviation of the combination of weights and the indicators, minimize the sum of deviation, in order to maximize the public interest, and finally come up with the combination of weights that reflect the decision maker's will and the objective attributes of the indicators.

The combination weight value of each indicator based on game theory is shown in Table 6. The game theory combination assignment method is to optimize the weights obtained by hierarchical analysis method and entropy weight method for countermeasures, in the game theory combination assignment model u1 reacts to the experience and preference of decision-makers' experts, and u2 reflects the objective performance of the evaluation object in the current status of deep learning. The two weight values are optimized to minimize the weight deviation according to the goal of NASH equilibrium. After the game theory assignment, the importance of the four first-level indicators is ranked as input evaluation, background evaluation, result evaluation and process evaluation in the order of importance, and the percentage of their game theory combination assignment is 0.3276, 0.2795, 0.2541 and 0.1388.

Among the secondary indicators, system construction ranks first, followed by teaching quality and teaching satisfaction, whose game theory combination assigns the value of 0.1391, 0.1345 and 0.1184, respectively.This indicates that system construction and teaching quality are extremely important to college students' mental health. This is because system construction requires school teachers to clarify the overall goal of mental health education, the goal of talent cultivation, and to improve the team of teachers in the psychology teaching and research department and the system of teaching, so as to better help students stay away from mental health disorders. Teaching quality, due to regular teaching seminars and exchanges, on-site observation and listening to lectures, irregularly organized teaching listening to lectures, teaching competitions, etc., teachers are required to continue to make progress while helping students to develop a planned study plan and maintain an energetic learning state, thus reducing the energy of the students to think nonsense and avoiding students from mental health problems.

Table 6. Each index is based on the combination weight of game theory

Primary indicator	The combination weight based on game theory	Secondary indicator	The combination weight based on game theory

Background evaluation	0.2795	Institutional setting	0.0593
		Institutional construction	0.1391
		Course setting	0.0689
		Campus culture construction	0.0122
Input evaluation	0.3276	Staff building	0.0287
		Teaching quality	0.1345
		Textbook target	0.0611
		Material content	0.1033
Process evaluation	0.1388	Teaching group	0.1083
		Teacher teaching	0.0305
Result evaluation	0.2541	Teaching management	0.0348
		Academic performance	0.1184
		Teaching satisfaction	0.1009

3.2. Fuzzy Comprehensive Evaluation of College Students' Mental Health

This survey takes the college students who have received mental health education in J-school as the research object, adopts the method of random sampling, and distributes the questionnaires through the teaching management personnel and professional teachers with various channels such as network QQ, WeChat, etc. A total of 350 questionnaires were distributed, with a recovery rate of 100%, eliminating the questionnaires that the answer time was too short, the rate of consistency of the options was too high, and the questionnaires that the answers with obvious logical errors were 7, and finally obtaining the valid questionnaires totaling 343 questionnaires, the effective rate is 98%.

3.2.1. Evaluation of knowledge perception:

1) Constructing evaluation matrix. According to the questionnaire data statistics, it can be known that the specific status of college students' knowledge of mental health is shown in Table 7.

Table 7. The cognitive cognition of college students' mental health knowledge

Classification	Very different	Basic difference	General	Basic consent	Very agree
Understanding the basic concepts of mental health	5	14	43	257	124
Clear mental health metrics	6	16	19	286	116
Basic categories of mental abnormalities	12	13	20	271	127
Understanding the existence of mental health problems	6	15	34	253	135
The way to improve mental health	15	18	46	220	144

The results of the fuzzy evaluation matrix of college students' mental health knowledge are shown in Table 8. College students' knowledge of mental health mainly includes knowledge of mental health basics, knowledge of psychological abnormalities and knowledge of ways to improve mental health, while the proportion of students who choose “basically agree” and “strongly agree” for the first two categories reached 75.3% and 71.49%, respectively. 71.49%, indicating that most of the college students have basic knowledge of mental health and have a clearer understanding of the categories of psychological abnormalities. Compared with the first two indicators, the students' awareness of ways to improve mental health (66.97%) needs to be further improved.

Table 8. Cognitive fuzzy evaluation matrix of mental health knowledge

Secondary indicator	Very different	Basic difference	General	Basic consent	Very agree
Cognitive health basic knowledge	0.0124	0.0465	0.1881	0.4702	0.2828
Cognitive abnormal category cognition	0.0123	0.0525	0.2203	0.4646	0.2503
Improve the cognitive understanding of mental health	0.0161	0.0592	0.255	0.3934	0.2763

2) Synthesizing the evaluation result vector. College students' mental health knowledge perception rating values are shown in Table 9. It can be seen that the college students' mental health knowledge cognition in the five evaluation levels accounted for the largest proportion of good 0.4084, according to the principle of maximum affiliation, the research object of the college students' mental health knowledge cognition performance is good, the score is 79.54.

Table 9. College students' cognitive score of mental health knowledge

Primary indicator	Mental health knowledge cognition
Very bad	0.0202
Worse	0.0478
General	0.2163
Good	0.4084
Excellence	0.3073
Maximum membership	Good
Comprehensive score	79.54

3.2.2. Evaluation of ideology:

1) Constructing the evaluation matrix. The specific status of college students' mental health ideology is shown in Table 10. Based on the results of the above survey, single-factor fuzzy evaluation is carried out and the single-factor fuzzy evaluation matrix is determined according to the frequency of the survey, so as to derive the fuzzy evaluation matrix of college students' mental health ideology.

Table 10. The students' mental health thoughts and thoughts are specific

Classification	Very different	Basic difference	General	Basic consent	Very agree
The consciousness of the formation of a special stage	12	50	74	198	109
Awareness of the physical characteristics of the body	14	62	55	194	118
There is a sense of mental health	9	84	49	199	102
There is an initiative to seek psychological help	8	30	72	224	109
There is a healthy awareness of life	7	69	43	214	110
Confident and self-motivated health awareness	5	29	67	229	113
Have the right self-evaluation consciousness	12	70	31	238	92
Regulation and control of the consciousness of the self	15	47	69	217	95

The fuzzy evaluation matrix of college students' mental health ideology awareness is shown in Table 11. College students' mental health ideology mainly includes awareness of group specificity, awareness of psychological problems and awareness of mental health. According to the statistical data, among

the above three indicators, only the proportion of students who agree with the awareness of group specificity reaches 68.95%, indicating that most of the students have a clearer awareness of group specificity. The proportion of students agreeing to the indicators of mental health awareness and awareness of psychological problems is 52.1% and 63.2% respectively. This shows that college students have not yet fully established the awareness of psychological problems, and the awareness of mental health needs to be strengthened. The college student group's view of mental health problems is still flawed, and the motivation to actively seek psychological help and build a positive and healthy mind is insufficient.

Table 11. College students' mental health idea fuzzy evaluation matrix

、	Very different	Basic difference	General	Basic consent	Very agree
Special consciousness of group	0.0075	0.0714	0.2316	0.4332	0.2563
Mental problem consciousness	0.0195	0.1303	0.3292	0.3594	0.1616
Mental health awareness	0.0147	0.092	0.2613	0.4902	0.1418

2) Synthesizing the evaluation result vector. College students' mental health ideology rating values are shown in Table 12. It can be seen that the mental health ideology of college students in the five evaluation levels accounted for the largest proportion of good 0.4084, according to the principle of maximum affiliation, the research object of the mental health ideology of college students is good performance, the score is 78.28.

Table 12. College students' mental health thought score value

Primary indicator	Mental health thought consciousness
Very bad	0.0202
Worse	0.0478
General	0.2163
Good	0.4084
Excellence	0.3073
Maximum membership	Good
Comprehensive score	78.28

3.2.3. Evaluation of practical skills:

1) Constructing the evaluation matrix. The specific status of college students' mental health practice ability is shown in Table 13. The fuzzy evaluation matrix of college students' mental health practice ability is constructed based on the frequency of the survey.

Table 13. The specific situation of mental health practice ability

Classification	Very different	Basic difference	General	Basic consent	Very agree
Sufficient learning motivation	14	62	51	122	94
Higher learning efficiency	10	48	131	102	52
Effective use of wisdom and ability	4	40	89	136	74
Adapt quickly to the new environment	6	59	63	142	73
Behavior and environmental coordination	8	22	79	152	82

Overcome difficulties	8	19	106	102	108
Maintain interpersonal communication	4	15	83	137	104
expressiveness	6	42	92	113	90
Rapid integration	12	43	79	118	91
Employment initiative	11	19	42	185	86
Stay positive	8	51	75	125	84
The job phase is good at self-recommendation	6	41	68	142	86

The fuzzy evaluation matrix of college students' mental health practice ability is shown in Table 14. College students' mental health practice ability mainly includes learning ability, environmental adaptation ability, interpersonal communication ability and employment ability. According to the statistical data, 44.53%, 55.95%, 55.61% and 53.43% of the students chose "basically agree" and "strongly agree" in the survey of the four indicators of "learning ability, environmental adaptability, interpersonal ability and employability", respectively, and the overall mental health practice ability of college students is average.

Table 14. Fuzzy evaluation matrix of mental health practice of college students

Secondary indicator	Very different	Basic difference	General	Basic consent	Very agree
Learning ability	0.0129	0.1161	0.4257	0.3246	0.1207
Environmental adaptability	0.0125	0.1117	0.3163	0.4562	0.1033
Interpersonal skills	0.0147	0.0728	0.3564	0.4032	0.1529
Employment capacity	0.0172	0.1054	0.3431	0.4132	0.1211

2) Synthesizing the evaluation result vector. The rating values of college students' mental health practice ability are shown in Table 15. It can be seen that the mental health practice ability of college students in the five evaluation levels accounted for the largest proportion of good 0.3757, according to the principle of maximum affiliation, the research object of the mental health practice ability of college students in the performance of the average, the rating is 69.52.

Table 15. College students' mental health practice ability rating

Primary indicator	Mental health thought consciousness
Very bad	0.0511
Worse	0.1248
General	0.3757
Good	0.3319
Excellence	0.1165
Maximum membership	Good
Comprehensive score	69.52

3.2.4. Comprehensive evaluation of the effectiveness of education. The results of the categorized comprehensive evaluation of the effect of mental health education for college students are shown in Table 16. The statistics and comprehensive scores show that the effect of mental health education for female students is better than that of male students. Comparison of grades shows that the comprehensive score of students as a whole increases gradually with the growth of grades, and the comprehensive scores of freshmen to seniors are between 69.55, 70.97, 72.46 and 73.48. The composite score of the effectiveness of mental health education of student cadres is significantly higher than that of non-student cadres, the composite score of only children is significantly higher than that of non-only children, and there is a positive relationship between the academic qualifications

obtained by parents and the composite score, with the level of academic qualifications obtained by parents increasing the composite scores of the students are also increasing. In addition, the effect of mental health education for urban students is superior to that of rural students.

Table 16. Psychological health education classification comprehensive evaluation

Categories		Very different	Basic difference	General	Basic consent	Very agree	Comprehensive score	Overall ranking
Gender	Man	0.0131	0.1095	0.3229	0.4077	0.1468	71.51	10
	Female	0.0216	0.1011	0.3035	0.4152	0.1586	72.29	7
Grade	Freshman year	0.0221	0.1221	0.3387	0.3987	0.1184	69.55	16
	sophomore	0.0137	0.115	0.3428	0.3727	0.1558	70.97	12
	Junior	0.0118	0.1082	0.2856	0.4262	0.1682	72.46	6
	Senior year	0.0107	0.0924	0.2915	0.41	0.1954	73.48	3
Identity	Student cadre	0.0152	0.0804	0.2758	0.4438	0.1848	73.88	2
	Nonstudent cadre	0.0163	0.1083	0.3323	0.3923	0.1508	70.67	13
Family composition	Only child	0.0278	0.1056	0.2503	0.4086	0.2077	73.42	4
	Nonsole	0.0119	0.0943	0.3575	0.4141	0.1222	71.08	11
Parents receive the highest degree	Primary school and below	0.0156	0.1441	0.3325	0.3694	0.1384	69.54	15
	Junior high school	0.0191	0.1192	0.3456	0.3869	0.1292	70.09	14
	High school	0.0173	0.0748	0.3149	0.451	0.142	72.92	5
	Undergraduate or college degree	0.023	0.0922	0.2437	0.4233	0.2178	74.48	1
Biotically	Country	0.0171	0.08	0.3304	0.4305	0.142	71.9	9
	Town	0.0137	0.1111	0.2856	0.4075	0.1821	72.19	8

4. Conclusions and recommendations

This paper establishes the evaluation index system of the effect of college students' mental health education, obtains subjective and objective weights through hierarchical analysis and entropy value method, and then obtains the final weights of the evaluation indexes affecting college students' mental health through the combination of assignment method. The fuzzy comprehensive evaluation method

is used to evaluate the implementation effect of college students' mental health education in the new media environment.

The results show that the evaluation system can effectively assess the implementation effect of college students' mental health education in the new media environment, and the overall level of the effect of college students' mental health education is good, which provides a powerful support for the improvement and innovation of mental health education in colleges and universities. However, there is a big difference in their grades and individual experience ability, and the degree of mastery of improving the knowledge of mental health methods and the awareness of actively seeking psychological help are low. Accordingly, this paper puts forward the following countermeasure suggestions:

One is to optimize the mental health education model in colleges and universities, focusing on innovating the form of mental health education for college students and enriching the content of mental health education activities. The second is to enhance the professionalization level of mental health education teachers, increase the investment in teachers' strength, focus on improving the operational level of teachers' mental health professional knowledge and strengthening communication with students. The third is to enhance students' self-education ability, focusing on improving students' attention to mental health education, strengthening self-learning and other aspects.

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