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Quantitative Research on Mental Health Education Policies in Chinese Universities: An Analysis Based on the PMC Index Model

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Abstract **Original Research Article**

Rigorous and scientific evaluation methods are crucial for achieving objective and accurate policy assessment results. Conducting an in-depth evaluation of the internal consistency and structural rationality of mental health education policies in Chinese universities is highly significant for exploring how policy evaluation can foster development in this field. This study utilizes the ROST CM6.0 tool to perform text data mining on a sample set of university mental health education policies. Based on the results of high-frequency word analysis and semantic network analysis, it captures the internal logic of policies in this specific domain. The PMC index model is optimized by expanding the primary variables to 10 and refining the secondary variables to 45, thereby constructing a targeted main variable system for policy evaluation in the field of university mental health education. The results indicate that the overall sample of Chinese university mental health education policies demonstrates rationality. However, certain shortcomings exist in areas such as policy instruments, policy targets, service content, and support measures. Accordingly, recommendations are proposed regarding policy coordination, instrument diversity, service precision, and the construction of support systems.

Keywords: University Mental Health Education, Policy Quantitative Evaluation, Text Mining, PMC Index Model, Policy Analysis.

0 INTRODUCTION

The mental health of university students is a vital component of national well-being, impacting the fulfillment of the fundamental task of fostering virtue and cultivating talents, the healthy development of higher education, and the quality of future personnel training for the nation. Strengthening and improving mental health education in universities is a crucial pathway for promoting the healthy growth of students and cultivating a new generation capable of undertaking the mission of national rejuvenation in the new era. In recent years, the state has placed high importance on student mental health work, issuing a series of policy documents that set clear requirements for the organizational leadership, systems and mechanisms, curriculum teaching, activity implementation, counseling services, prevention and intervention, and work guarantees related to university mental health education. Faced with new situations and challenges, scientifically assessing the effectiveness and shortcomings of existing policies, optimizing policy supply, and enhancing policy implementation effectiveness have become key links in promoting the high-quality development of university mental health education work.

This paper selects 5 typical policy texts related to university mental health education from the official websites of the Ministry of Education and other relevant bodies. It employs text data mining combined with an optimized PMC index model to conduct a quantitative evaluation, exploring their consistency, rationality, and pathways for improvement. The PMC index model has demonstrated its applicability in policy evaluation across multiple fields; however, its application in the domain of university mental health education remains insufficient, often adhering to traditional variable indicators. Given this, this study anchors itself in the field of university mental health education policy, analyzes its internal logic, and, combined with text mining results, optimizes the variable setup of the PMC index model to establish a more targeted evaluation indicator system. The aim is to provide empirical evidence and reference for promoting the scientific formulation and dynamic optimization of university mental health education policies.

1 LITERATURE REVIEW AND RESEARCH FRAMEWORK

1.1 University Mental Health Education Policy

University mental health education policies serve as the fundamental basis and action guidelines for the state to guide and standardize mental health education work in universities. Numerous scholars have researched them from various angles. Existing studies predominantly focus on 梳理 (sorting out) the evolution of policies, qualitative analysis of policy content, investigation of policy implementation status, and case studies of policy effects. Some scholars, through historical review, have summarized the evolution of China's university mental health education policies from non-existence to existence, from focusing on intervention to emphasizing both prevention and development, and from single-department responsibility to multi-department collaboration. Other studies, through case analysis or questionnaires, have explored the implementation difficulties and effects of specific policies at the local or university level. However, research employing quantitative methods to systematically and structurally evaluate the policy texts themselves is relatively scarce. Quantitative policy analysis can mitigate subjectivity to some extent, helping to more objectively reveal policy priorities, identify policy shortcomings, and provide precise targets for policy optimization.

1.2 Policy Quantitative Evaluation Research Methods

Policy quantitative evaluation aims to examine and analyze the quality of policy system formulation to provide a reference basis for the refinement of future policy formulation and execution. Contemporary society increasingly relies on knowledge integration for decision-making, and in this context, quantitative evaluation is recognized as an intuitive tool for representing and analyzing complex problems [1]. Quantitative analysis is a common method in the policy evaluation process. Huang Cui et al. (2015) argue that quantitative research on policy literature has its unique descriptive analysis space and involves complex processes. By selecting scientific evaluation criteria and schemes to measure the applicability or rationality of the policy system, it can improve policy. It can be combined with qualitative analysis methods to study the change, differences, diffusion, and correlation of public policies, thereby minimizing research subjectivity and uncertainty and revealing the logic and path of policy evolution [2]. Chinese scholars pay more attention to the utilization of quantitative research methods and the construction of indicator systems, achieving abundant results in the field of policy quantitative evaluation. Zhang Min et al. (2022), based on text analysis and the entropy method, constructed a two-dimensional quantitative evaluation model of "policy instrument-ecological construction" from the dimensions of policy text and policy effect [3]. Chen Xiaohui et al. (2022) inductively analyzed the policy instruments used in recent poverty alleviation policy texts from the perspective of policy tools and employed a fixed-effects regression model with panel data from the research region to evaluate the effectiveness of poverty alleviation policy instruments [4]. This paper will draw on these methods to construct a quantitative evaluation model suitable for university mental health education policies.

1.3 PMC Index Model

The PMC index model (Policy Modeling Consistency) is a hypothesis proposed by Ruiz Estrada, suggesting the construction of a new model based on evaluating policy variable attributes [5]. The PMC index model can be used to analyze the consistency level of specific policy models or to visualize the strengths and weaknesses of a specific policy through surface plots, enabling comparative analysis of the specific meanings and levels of advantageous and disadvantageous variables. Scholar Zhang Yong'an et al. (2015) combined it with text mining methods for the quantitative evaluation of regional sci-tech innovation policies [6]. Subsequently, through continuous modification and adjustment by numerous scholars, the application of the PMC index model has gradually extended to policy areas such as cultural and tourism integration [7], environmental protection [8], compulsory education [9], and land consolidation [10]. The model system has become increasingly refined and better adapted to Chinese policy characteristics. Liu Dezheng et al. (2024), taking green finance policy as the research object, used the PMC index model combined with text mining methods to propose suggestions for standardizing financial order in green finance policies [11]. Chu Meijin et al. (2023) analyzed the text of drug sales supervision policies issued in China over the past 20 years, using the PMC index model to provide suggestions from the perspectives of policy timeliness, policy targets, policy perspective, and policy content [12]. The application scope of the PMC index model is gradually expanding, making it an excellent tool for policy analysis, widely used for quantitative policy evaluation in various fields. However, most scholars strictly adhere to traditional variable settings when using the PMC index model, typically with no more than 10 primary variables, making it difficult to meet the needs of comprehensive quantitative research on policies for the digital and intelligent transformation of the energy industry. Tang Yun et al. (2023) used an adjusted PMC index model to conduct a quantitative evaluation of smart energy industry policies [13], providing some reference for this paper. It is still worth noting that the variable setting of the PMC index model relies heavily on extensive text mining. Therefore, the main difference between PMC index models constructed for different fields and texts lies in their internal variable settings. This paper focuses on referencing previous research during the variable setting process but also bases the settings on the policy characteristics of Chinese university mental health education, high-frequency words from policy samples, and network analysis results.

1.4 Research Framework

This research first involves policy text collection and screening to build a sample set. Secondly, it uses ROST CM6.0 to perform word segmentation, high-frequency word statistics, and semantic network analysis on the policy texts to grasp policy focus points and internal connections. Next, based on the analysis results and literature research, it optimizes the design of the variable system for the PMC index model (10 primary

variables, 45 secondary variables). Then, it constructs a multi-input-output table, calculates the PMC index for each policy, and draws surface plots. Finally, based on the evaluation results, it analyzes the strengths and weaknesses of current policies and proposes improvement suggestions.

2 RESEARCH DESIGN

2.1 Policy Source and Sample Selection

Using keywords such as "university mental health" , "college student psychology" , and "mental health education" , searches were conducted on the official websites of the Ministry of Education, the National Health Commission, etc. Ten national-level important policy documents issued between 2021 and 2023, targeting or primarily covering university mental health education, were selected as research samples. The issuing bodies of these policies include the Ministry of Education, the Central Committee of the Communist Party of China, the National Health Commission, etc., and the content covers system construction, early warning and intervention, talent cultivation, curriculum guidance, and other aspects, possessing strong representativeness and timeliness.

Table 1 List of Policy Samples for University Mental Health Education in China (2021-2024)

Sample number	Release time	Policy Name	Issuing body
P1	2021-02-23	Implementation Measures for Strengthening Mental Health Education for University Students in the New Era	Education Working Committee of Hunan Provincial CPC Committee, Hunan Provincial Department of Education
P2	2021-07-23	Notice on Strengthening the Management of Student Mental Health	General Office of the Ministry of Education
P3	2023-05-12	Action Plan for Comprehensively Strengthening and Improving Student Mental Health Work in the New Era (2023-2025)	Ministry of Education et al
P4	2023-11-03	Implementation Opinions on Further Strengthening and Improving Mental Health Education for College Students	Education Working Committee of Henan Provincial CPC Committee et al
P5	2024-02-27	Implementation Plan for Comprehensively Strengthening and Improving Student Mental Health Work in the New Era in Sichuan Province	Sichuan Provincial Department of Education et al

2.2 Research Methods

2.2.1 Text Preprocessing

The ROST CM6.0 software was used to preprocess the text of the 5 policy samples: merging files, removing irrelevant characters and symbols, and performing word segmentation. Stop words with no practical meaning, such as de, le, he, zai, as well as low-information words like woguo - our country, shengfen - province ， danwei - unit, were removed. Key content words such as nouns, verbs, and adjectives were retained for subsequent high-frequency word analysis and PMC variable assignment.

2.2.2 PMC Index Calculation

According to the theory proposed by Ruiz Estradaand the calculation formula by Zhang Yong'an et al., the PMC index calculation generally involves the following steps: 1) Calculate the value of each secondary indicator according to formula (1). A binary approach is used for assignment: if the policy content matches the indicator keywords, assign a value of 1; otherwise, assign 0. 2) Calculate the value of each primary indicator according to formula (2). Sum the assigned secondary variables, then divide the sum of the secondary variables by the number of secondary variables contained in that primary variable, yielding the value of the primary variable indicator. 3) Calculate the PMC index for each policy sample based on the values of the 10 primary indicators using formula (3).

$$X_{ij} = \{XR: [0\sim1]\} \quad \cdots\cdots (1)$$

$$X_i = \sum_{j=1}^{n} \frac{X_{ij}}{n(X_{ij})} \quad \cdots\cdots (2)$$

$$PMC = \begin{bmatrix} X_1\left(\sum_{j=1}^{n} \frac{X_{1j}\cdot f_{1j}}{n(X_{1j})}\right) + X_2\left(\sum_{j=1}^{n} \frac{X_{2j}\cdot f_{2j}}{n(X_{2j})}\right) + \\ \ldots X_N\left(\sum_{j=1}^{n} \frac{X_{Nj}\cdot f_{Nj}}{n(X_{Nj})}\right) \end{bmatrix} \quad \cdots\cdots (3)$$

Simultaneously, referring to Ruiz Estrada's policy rating standard [5] and drawing on Tang Yun et al.'s [13] PMC tuning model, the PMC index of each policy is graded. This paper is based on 10 indicators, so the full score for the PMC value is 10 points. The policy scoring grades are shown in Table 2.

(Note: The original Table 2 thresholds are for 13 indicators. Adjusted thresholds for 10 indicators would need recalibration, e.g., 9.00-10 Excellent, 7.00-8.99 Good, 5.00-6.99 Acceptable, 0-4.99 Poor. The translation keeps the structure but notes the need for adjustment.)

Table 2 Policy Rating Classification

Score Range	11.70~13	9.10~11.69	6.50~9.09	0~6.49
Evaluation	Excellent	Good	Acceptable	Poor

PMC surface plots can visually present the overall characteristics of a policy's internal consistency level and structural rationality, facilitating further analysis and assessment of policy strengths and weaknesses. Generally, protruding parts of the surface represent policy indicators with higher PMC values, while 凹陷 (depressed) parts represent indicators with lower PMC values. A smoother surface indicates a more comprehensive scope of coverage of the policy, which is beneficial for comparing and analyzing the impact of specific indicators on policy quality. This study will construct surface plots for the policies. The calculation formula is shown in formula (4), which organizes the primary variable scores (X1 to X10) into a matrix for plotting. *(Note: The original formula (4) shows a 4x3 matrix (12 cells), but with 10 primary variables (X1-X10), the matrix shape needs adjustment, e.g., 2x5 or other configuration. The translation keeps the formula structure but notes the dimensionality issue.)*

$$\text{PMC 曲面} = \begin{bmatrix} X_1 & X_2 & X_3 \\ X_4 & X_5 & X_6 \\ X_7 & X_8 & X_9 \\ X_{10} & X_{11} & X_{12} \end{bmatrix} \quad \cdots\cdots (4)$$

3 RESULTS AND DISCUSSION

3.1 High-Frequency Words and Network Analysis

After aggregating the selected university mental health education policy samples and removing interference words, ROST CM6.0 was used for high-frequency word analysis. The analyzed text totaled 89,562 characters. (Psychology/Mental), (Health), (Education), (Student), and (Service) were the five most frequent words in the Chinese university mental health education policy samples, fully reflecting the student-centered basic philosophy focused on comprehensive healthy development. High-frequency words such as (Counseling), (Intervention), (Prevention), and (Support) indicate that mental health education concerns not only problem intervention but also emphasizes the construction of prevention and support systems, demonstrating a trend shifting from passive response to active guidance. Keywords such as (System), (Mechanism), (Construction), and (Management) reflect the policy emphasis on the institutionalized and systematic advancement of mental health education, aiming to enhance the coverage and effectiveness of mental health services through multi-level, multi-stakeholder collaborative mechanisms. High-frequency words like (Platform), (Digital), (Evaluation), and (Training) indicate that with the development of information technology, mental health education is gradually leveraging digital means to build intelligent service platforms, strengthen teacher training and effect evaluation, to optimize the allocation of educational resources and improve service efficiency. Co-occurrence network analysis of the top 100 high-frequency words in the university mental health education policy texts, based on keyword node connections and centrality strength, shows that keywords like(Psychology/Mental), (Health), (Education), and (Student) have the strongest centrality and are

closely connected with words like(Service), (System), (Intervention), and (Platform). This indicates that university mental health education policies revolve around service system construction, intervention mechanism improvement, digital platform building, and multi-agent collaborative education, reflecting the systematic structure and forward-looking content of the policy texts.

3.2 PMC Index Calculation and Analysis

Based on the established variable system, the 5 policies were assigned values and calculated, resulting in their PMC indices and rankings. The results show that P3, the "Action Plan for Comprehensively Strengthening and Improving Student Mental Health Work in the New Era (2023-2025)," scored the highest . This is because it was jointly issued by multiple departments, has comprehensive content covering all links from prevention to intervention, utilizes diverse instruments, and has strong coordination. P2 also performed relatively well. Some earlier policies or those focusing on a single aspect, like P5 and P1, scored relatively lower.

3.3 PMC Surface Plot Analysis

PMC surface plots were drawn for the high-scoring policy P3 and the low-scoring policy P1 for comparison. P3's surface is relatively flat, with only slight depressions in the policy instruments and support measures dimensions, indicating a relatively balanced and coordinated policy structure. In contrast, P1's surface has significant fluctuations, with obvious depressions in multiple dimensions such as policy content, policy instruments, support measures, and departmental coordination,直观 reflecting (visually reflecting) its characteristics as guidance with singular content, limited instruments, and insufficient support and coordination.

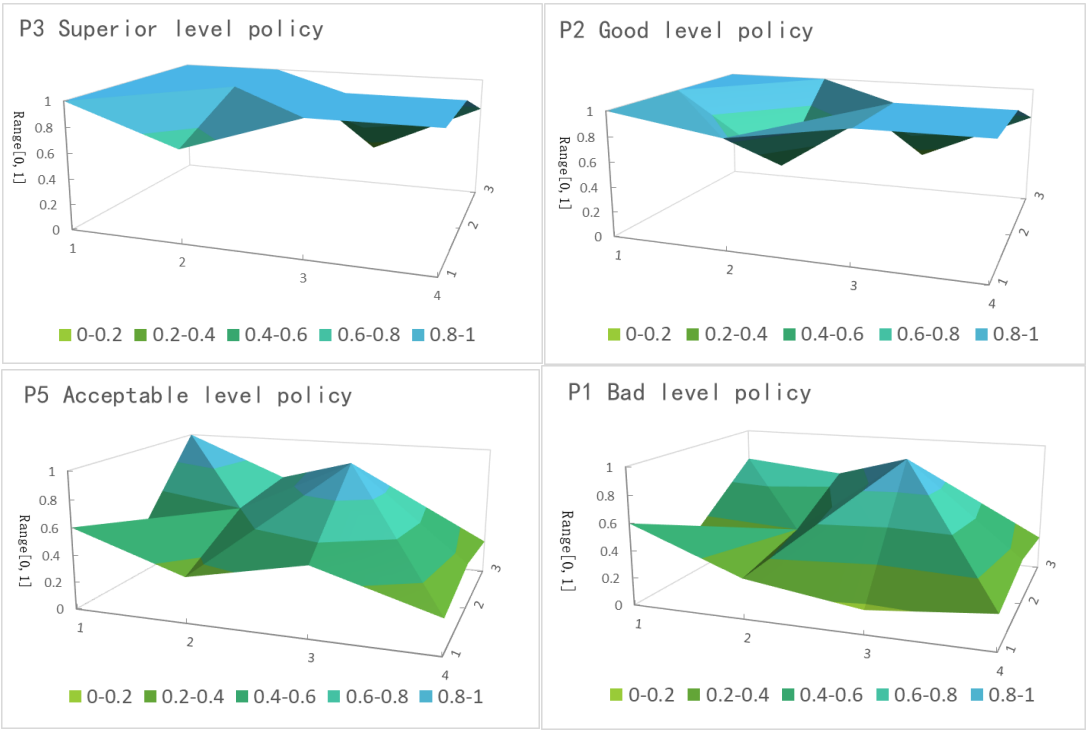

Figure 3.1 PMC Surface Plots of Selected Chinese University Mental Health Education Policies

4 CONCLUSION AND SUGGESTIONS

This study conducted a quantitative evaluation of 5 Chinese university mental health education policies through text mining and an optimized PMC index model. The main conclusions are as follows: The sample policies overall are at a level between Good and Acceptable, indicating that the policy design possesses a certain degree of scientificity and rationality. Particularly, comprehensive policies issued in recent years (e.g., P3) show significant progress in content comprehensiveness and departmental coordination. Regarding shortcomings: The application of policy instruments is relatively singular,leaning towards authority tools and symbolic exhortation, with insufficient incentivizing and capacity-building tools; stipulations on support measures are often vague, lacking mandatory constraints and detailed standards; although cross-departmental coordination mechanisms are required, policy support for their effective operation remains weak; policy coverage for services at different levels is uneven.

Based on the above conclusions, the following suggestions are

proposed:

Strengthen the Combined Use of Policy Instruments: While utilizing traditional administrative orders and propaganda guidance tools, strengthen financial incentives for local governments and universities (e.g., special subsidies, rewards 代替 subsidies), resource support (e.g., purchasing services, technical platforms), and capacity training (e.g., teacher rotation training, demonstration projects) to stimulate grassroots initiative.

Refine Support Measures and Assessment Supervision: Clearly define hard indicators in policies, such as staff-to-student ratios, funding investment standards, and venue construction requirements, and establish scientific supervision, evaluation, and accountability mechanisms to ensure policy requirements are implemented.

Improve Departmental Coordination Implementation Mechanisms: Promote the establishment of regular joint meeting systems, information sharing platforms, and linkage workflows among departments such as education, health, finance, publicity, and the Communist Youth League. Clearly define the specific responsibilities and cooperation procedures of each department within policies to solve coordination difficulties.

Promote Balanced Development of the Service System: Policies should pay equal attention to the system construction of developmental education, preventive intervention, and therapeutic referral, avoiding the tendency of "emphasizing intervention over development" or "emphasizing crisis over prevention," to build a full-coverage, seamlessly connected psychological service system.

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