
From General to Precise: Research on the Application of Digital Platforms in the Hierarchical Early Warning and Intervention of Psychological Risks among International Medical Students—Based on the Practice of the “Zhejiang Ideological and Political Education” Platform

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Abstract: This study explores how digital platforms can empower traditional mental health work models to address precision challenges such as delayed warning and generalized services in psychological support for international medical students in China. Taking the application of Wenzhou Medical University’s “Zhejiang Ideological and Political Education” platform as a case, a mixed-methods approach was adopted. First, the core functions and workflow of the platform in dynamic management of mental health records, three-tier risk classification, and dynamic tracking were systematically analyzed. Second, quantitative data from three dimensions—early identification rate, warning response time, and intervention measure matching degree—were compared before and after the platform’s deep application (2024 vs. 2025). Finally, through in-depth interviews and policy text analysis, the ethical boundaries in digital practice were examined. The application of the digital platform increased the early identification rate of psychological issues from 75.6% to 89.2%; the average response time for high-risk cases from anomaly detection to professional assessment was shortened from 5.2 days to 2.1 days; and the matching degree of intervention plans based on data analysis improved significantly. Meanwhile, the study clarified the operational pathways of key ethical principles such as “minimum necessary data collection,” “informed consent,” and “encryption and desensitization” in practice. The conclusion indicates that digital platforms can significantly enhance the precision and timeliness of psychological support for international medical students by enabling data-driven risk stratification and intelligent resource matching. However, their application must be built upon a solid ethical framework and institutional safeguards to balance technological efficacy with humanistic care.

Keywords: International Students in China; Mental Health; Digital Platform; Precision Intervention; Risk Warning; Data Ethics; Medical Education

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1. Introduction

Amid the dual waves of internationalization and digital transformation in higher education, the mental health of international medical students in China has become a core issue concerning education quality and campus safety. This group faces dual high pressure from cross-cultural adaptation and rigorous medical studies, making psychological problems highly prevalent, concealed, and complex^[1]. Traditional mental health support models often rely on counselors' experience, periodic general surveys, and passive reception, commonly suffering from bottlenecks such as delayed warnings, resource mismatch, and information silos, making it difficult to achieve precise identification and timely intervention for high-risk individuals^[2].

In recent years, big data and artificial intelligence technologies have offered possibilities for paradigm shifts in mental health work. However, existing research mostly focuses on generalized discussions of technological prospects or the digitization of universal psychological scales, lacking micro-level process and empirical effectiveness studies on how digital platforms systematically reshape workflows and enhance intervention precision in specific cultural-educational contexts (such as international medical education in China). Therefore, clarifying the specific application pathways, objective efficacy, and ethical boundaries of digital tools in real work scenarios holds significant theoretical and practical importance^[3].

This study takes the deep application of the Zhejiang provincial digital platform for ideological and political work, "Zhejiang Ideological and Political Education," in the mental health management of international students at Wenzhou Medical University as a case. It aims to answer three specific questions: (1) Through which core functional modules does the digital platform transform traditional workflows? (2) What quantifiable effects has the platform's application produced in improving warning precision, shortening response time, and optimizing intervention matching? (3) How should ethical norms be constructed and practiced to mitigate risks when using digital tools to monitor and manage students' psychological data? This study attempts to provide an operational, effective, and reflective model for universities to leverage digital technology for the precise and scientific transformation of mental health services.

2. Methods

This study employed an embedded single-case study design, focusing on the application practice of the "Zhejiang Ideological and Political Education" platform over one complete work cycle (the 2024-2025 academic year).

2.1. Research context and participants

The research was conducted at the International Education College of Wenzhou Medical University, involving 525 international medical students. Since 2024, the university has fully integrated the mental health management module of the platform into its "Three Preventions and Three Promotions" work system, using it as the core technological vehicle to achieve "prevention at the earliest stage."

2.2. Data collection

Three types of data were collected:

Platform Function and Process Data: Through system backend logs, function screenshots, operation manuals, and semi-structured interviews with 3 platform administrators and 5 core counselors, the functional architecture and application processes of the platform in the mental health domain were detailed.

Quantitative Efficacy Data: Key indicators were extracted from the platform database and work records for before-and-after comparison (using early 2024 as the pre-deep-application baseline and the end of 2025 as the evaluation point):

Early Identification Rate: The proportion of students whose psychological issues were eventually confirmed by professional assessment based on platform warning clues, out of the total number of newly identified psychological issues in that semester.

Warning Response Time: The average time interval (in days) from the system's first generation of a high-risk warning for a student to that student's completion of the first professional psychological counseling or psychiatric assessment.

Intervention Matching Degree: An expert review panel (including 1 psychiatrist and 2 senior psychological counselors) conducted blind reviews and scored 40 randomly selected intervention plans (20 from 2024, 20 from 2025) using a 7-point scale to assess their matching degree with the student's problems and cultural background.

Qualitative Ethical Data: Relevant privacy policy texts and student informed consent form templates were collected and analyzed. In-depth interviews were conducted with 8 students (including 4 who had been subject to warning and intervention) to understand their perceptions, attitudes, and concerns regarding data use.

2.3. Data analysis

Triangulation was used for integrated analysis. Quantitative data were presented using descriptive statistics and comparative analysis to show trends. Interview and text data were analyzed using thematic analysis to extract core themes regarding platform operation mechanisms and ethical practices.

3. Results

3.1. The empowerment pathway of the digital platform: from “Experience-Driven” to “Data-Driven”

The “Zhejiang Ideological and Political Education” platform restructured the workflow through three core functions:

Dynamically Integrated Psychological E-Archive: Breaking down departmental barriers, it integrated scattered data such as freshman psychological screening, semester emotional questionnaires, counselors' daily observation records, leave records, and academic warnings to form a dynamically updated digital profile of students' mental health.

Intelligent Hierarchical Warning System: The platform's built-in algorithm model, based on norms for international medical students, analyzes e-archive data to automatically categorize students into three risk levels: “Red (Close Attention), Yellow (Focused Attention), Blue (Routine Attention),” and pushes real-time warning alerts to corresponding counselors and psychological committee members^[4].

Closed-Loop Task Management and Resource Matching: Upon warning generation, the platform automatically creates to-do tasks and assigns them to responsible personnel (e.g., “Schedule psychological counseling,” “Initiate home-school communication”). The embedded resource map intelligently recommends matching psychological counselors, relevant lectures, or support group activities based on the student's problem type (e.g., “academic anxiety,” “cultural adaptation”) and language preference, and tracks task completion.

3.2. Effectiveness evaluation of digital empowerment: dual enhancement of precision and timeliness

Comparison before and after the deep application of the platform showed significant improvement in key efficacy indicators:

Early Identification Rate: Increased from 75.6% to 89.2%. By analyzing behavioral combination patterns such as academic decline accompanied by late dormitory returns, the platform successfully identified several cases of students with concealed depressive tendencies, who were easily missed under traditional models^[5].

Warning Response Time: The average response time for high-risk (red) cases was significantly reduced from 5.2 days to 2.1 days. The efficiency gain primarily stemmed from the automatic push of warning information and closed-loop task management, which reduced communication and handover delays.

Intervention Measure Matching Degree: Expert blind review scores showed that the average matching score for 2025 intervention plans (5.8 points) was significantly higher than that for 2024 (4.3 points). Counselors reported that the “student profile” and resource recommendations provided by the platform gave them more basis for formulating preliminary intervention plans.

3.3. Exploring ethical boundaries: between efficacy and rights

Ethical concerns raised by digital monitoring were addressed in practice through the following mechanisms:

“Graded Authorization” and “Minimum Necessary” Principles: The collection of basic behavioral data (e.g., attendance) did not require secondary authorization, but such data was aggregated anonymously when used for psychological analysis. Access to sensitive information like psychological scale results and one-on-one conversation records was strictly controlled based on personnel roles (e.g., regular teacher vs. counselor) and warning levels.

Transparent Informed Consent and Education: A dedicated module in the freshman orientation used multiple languages to explain the purpose, scope, use of data collection, and students’ rights (e.g., right to refuse, right to inquire). Interviews found that most students understood the necessity of data collection for providing support.

Technical Safeguards and Institutional Constraints: All sensitive data was encrypted and desensitized during transmission and storage. The university also issued the “Management Measures for International Students’ Mental Health Data (Trial),” clearly stipulating data retention periods, usage scopes, and penalties for violations, institutionalizing ethical requirements^[6].

4. Discussion

This study confirms that deeply embedding a digital platform into the mental health work for international medical students can substantively promote its transformation from being vague, passive, and universal to being precise, proactive, and personalized. The essence of this transformation is shifting the basis of decision-making from reliance on individual experience to reliance on multi-source data fusion analysis. Its core value lies in expanding the breadth of monitoring, deepening the precision of assessment, and accelerating the speed of response.

4.1. The platform as a “System Coupler” and “Cognitive Enhancement Tool”

The value of the “Zhejiang Ideological and Political Education” platform lies not only in its technological functions but also in its role as a “system coupler,” tightly connecting the four-level (university-college-class-dormitory) human network with the digital system. This enables front-end observations to be instantly converted into data and back-end warnings to precisely reach responsible personnel. Simultaneously, it serves as a “cognitive enhancement tool” for counselors, assisting them in making more scientific and comprehensive judgments by providing structured information and intelligent prompts, thereby compensating for potential cognitive biases arising from cultural differences or lack of experience.

4.2. The logic of realizing precision intervention: from “Labeling” to “Profiling”

Traditional hierarchical management can easily devolve into simplistic “labeling,” whereas the digital platform constructs multi-dimensional, three-dimensional psychological “profiles” of students through dynamic data integration. This enables interventions not only to match the severity of the problem (stratification) but also to connect with its specific causes and cultural context (subtyping). For instance, for students both labeled “anxious,” the platform might recommend different intervention resources (academic tutoring vs. social skills group training) based on differences in their data traces (e.g., frequent searches for exam materials vs. low-frequency social activity records), truly approaching “one plan per individual.”

4.3. Ethical risks and the cornerstone of trust

This study found that the greatest ethical challenge is not technological but lies in translating abstract principles into concrete practices in daily work. Clear communication, strict access controls, and visible security safeguards form the cornerstone for winning the trust of international students—a group particularly sensitive to privacy rights. Once trust is broken, data collection becomes unsustainable, and precision intervention loses its foundation. Therefore, ethical compliance is not a constraint on development but a prerequisite for the sustainable development of digital empowerment.

4.4. Research limitations and future directions

The limitations of this study lie in the fact that its effects might be influenced by the specific organizational culture of the institution and its high emphasis on digital work. Furthermore, long-term effects (e.g., on academic achievement, cultural identity) require further tracking. Future research could deepen in two directions: first, developing and validating warning algorithm models better adapted to cross-cultural contexts; second, exploring privacy-preserving computation technologies like “federated learning” to enable multi-institution joint modeling while ensuring data does not leave its original domain, thereby enhancing the generalizability and scientific rigor of the models.

5. Conclusion

Through a micro-level analysis of the practice of the “Zhejiang Ideological and Political Education” platform, this study reveals the specific pathways and actual efficacy of digital empowerment in the mental health work for international medical students. The research demonstrates that a well-designed digital platform, deeply integrated into the workflow, can achieve earlier risk warning, more agile intervention response, and more precise service matching through data-driven mechanisms, thereby effectively addressing the bottlenecks of traditional models. However, the realization of technological efficacy must be embedded within a robust ethical framework and institutional safeguards. Only by consistently adhering to a student-centered approach, placing privacy protection, informed consent, and data security at the core, can we build an efficient and trustworthy mental health support system in the digital age. This provides important empirical evidence and ethical action guidelines for higher education institutions nationwide, especially medical schools, when utilizing digital technology to innovate mental health service models.

Disclosure statement

The author declares no conflict of interest.

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