

Research on the construction of a large-model agent for precision mental health services for college students

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Abstract: In response to the increasingly hidden nature of psychological distress among college students, the diversification of service needs, and the lag in service response, constructing a large-model agent to assist precision mental health services has considerable practical value. Relying on semantic understanding, emotion recognition, task planning, and resource coordination, the system forms a closed service loop covering need perception, state assessment, tiered support, human referral, and continuous feedback; on the basis of clearly defined professional boundaries, data security, and ethical responsibilities, it can enhance the initiative, adaptability, and continuity of university mental health services, thereby providing an intelligent pathway for optimizing the student growth support systems.

Keywords: college students; mental health; precision services; large-model agent; intelligent support

1 Introduction

After entering university, individuals move from a relatively stable secondary-school environment into a more open and complex campus life, where academic competition, interpersonal adaptation, emotional relationships, employment pressure, and family expectations become closely intertwined, and certain psychological difficulties may gradually accumulate in daily silence. Although existing university mental health work has developed a system combining courses, counseling, crisis intervention, and publicity education, problems remain prominent, such as students' reluctance to seek help, teachers' difficulty in noticing problems in time, and the limited precision of service-resource matching. As large-model technology shifts from simple question-answer generation toward task collaboration, the potential of agents in gentle companionship, need identification, and resource connection is becoming increasingly visible.

2 Foundation for constructing a large model agent for precision mental health services among college students

The shift toward precision mental health services among college students arises from the fact that psychological distress is no longer merely emotional fluctuation, but is often intertwined with academic pressure, social adaptation, career expectations, and self-identity, appearing in hidden, sustained, and context-specific forms. The traditional model, which depends on students' active help-seeking and teachers' experiential judgment, can respond to visible needs, yet it often fails to reach those who have accumulated pressure but have not yet spoken out. Relying on semantic understanding, emotional perception, and task coordination, a large model agent can identify vague expressions in low-threshold interactions, clarify real needs, and address general distress through knowledge explanation, emotional support, and

resource connection, while forwarding persistent pressure or abnormal signals to human intervention. Such technological embedding does not replace professional counselors; rather, it moves intelligent support to the service entrance and follow-up process, enabling universities to identify needs earlier, match resources more accurately, and sustain support more steadily.

3 System construction of a large-model agent for precision mental health services among college students

3.1 A multi-source data perception architecture for precise identification

In the construction of a large-model agent system, the key lies in expanding mental health services from single dialogue to collaborative perception based on multi-source information [1]. Centered on students' authorized emotional narratives, psychological assessment outcomes, counseling appointment records, learning-adaptation feedback, and campus service resources, a technical chain of "data collection—semantic parsing—state assessment—service matching" can be established. In this way, students' needs no longer remain scattered expressions, but are transformed into structured and traceable service clues. To prevent the technological application from sliding into excessive monitoring, data collection should adhere to the principle of minimum necessity, focusing mainly on students' active expressions and authorized information within educational service scenarios; with the help of desensitization processing, hierarchical permission, and log tracing, the boundaries of data use can be clarified and the whole process kept controllable.

In the state-assessment stage, a comprehensive psychological support index may be introduced to measure the current intensity of support required by students, with the basic expression as follows:

$$S = \alpha E + \beta P + \gamma \gamma + \delta R$$

In this formula, S represents the psychological support index, E represents the degree of negative emotion, P represents the duration and intensity of pressure, B represents behavioral-change clues, R represents the insufficiency of accessible support resources, and α , β , γ , and δ are weight coefficients. This formula is not intended to simply "label" students, but to provide a reference basis for the Agent's tiered responses; when S remains in a lower range, the system may provide psychological knowledge, emotion records, and self-adjustment suggestions, while when S continues to rise or changes suddenly, human review should be prompted, so that precise identification is supported by technical evidence while still retaining the warmth of educational judgment.

3.2 Intelligent interaction and task collaboration mechanisms for tiered support

The interaction mechanism of the large-model agent should shift from "single-response Q&A" toward "task-based companionship", enabling the system to complete intention recognition, problem clarification, resource recommendation, and process follow-up around students' real situations. For common difficulties such as exam anxiety, dormitory conflicts, social withdrawal, and employment confusion, the Agent can use multi-turn dialogue to identify the core needs behind students' expressions, and generate different support pathways according to the severity of the problem: For mild psychological distress, intervention focuses on emotional acceptance and cognitive adjustment, for moderate distress, the system guides students to access campus psychological resources, and for higher-concern states, the system triggers human referral and continuous observation procedures. What is formed in this way is not a mechanical response mode, but a service collaboration model with clear levels and flexible state transitions.

In terms of task collaboration, the Agent should also interconnect psychological counseling appointment platforms, counselor work systems, mental health course resources, and crisis-intervention procedures, embedding "identification—suggestion—referral—feedback" into a unified closed loop. After completing a dialogue, the system may record subsequent state changes with the student's authorization, and initiate gentle reminders at appropriate times, such as

emotion recording, sleep adjustment, counseling appointment confirmation, or activity participation suggestions; on the teacher side, teachers can obtain risk alerts and service feedback that have undergone desensitization and hierarchical processing. Such a mechanism means that technology is no longer merely a front-end tool, but becomes a coordinating node in the university mental health service network, improving the efficiency of resource matching while also strengthening students' sense of continuous support.

4 Application security guarantees of large-model agents in precision mental health services among college students

4.1 Service boundaries and ethical governance under human-machine collaboration

When a large-model agent is deployed in the scenario of college student mental health services, what should be stabilized most is not technical speed, but the clarification of service boundaries [2]. Psychological distress has strong individual differences and contextual sensitivity; the agent may undertake auxiliary tasks such as emotional listening, knowledge explanation, resource guidance, and status reminders. However, it cannot replace psychological counselors in making diagnostic judgments, nor can it conduct closed-loop automatic handling of crisis cases. A more prudent approach is to set up a multi-layered protection chain at the system level, namely "model response—rule verification—human review—professional referral"; when students' expressions contain signals such as self-harm ideation, extreme despair, persistent insomnia lasting over than 14 days, obvious eating abnormalities, or a decline in social functioning, the system should no longer continue ordinary dialogue, but should push risk alerts to professionals within the authorized scope and complete initial human verification within 30 min to 2 h. Meanwhile, student data should adopt hierarchical authorization, field desensitization, and access-trace mechanisms; sensitive data such as identity information, counseling records, and emotional texts should be stored in separate databases, and key fields should be encrypted with a minimum strength of 256 bits, laying a secure and trustworthy foundation for intelligent services.

4.2 Evaluation feedback and service improvement oriented toward continuous optimization

The application effect of a large-model agent should not be judged only by usage frequency or dialogue rounds; more importantly, it should be examined in terms of whether it truly improves need identification, resource matching, and follow-up support quality. Universities may establish an evaluation system from four dimensions: technical performance, service process, student experience, and professional collaboration, and conduct monthly reviews so that model iteration and mental health service improvement remain synchronized. For operational management, the following indicators may be adopted; the relevant indicators can serve as construction-phase targets or school-level pilot references, and should be dynamically adjusted according to school scale, the number of counseling staff, and the student population.

Table 1. Operational evaluation indicators for large-model agent-based precision mental health services

Indicator Category	Core Indicator	Suggested Target Value	Evaluation Significance
Technical performance	Average response latency	≤ 3 s	Ensures smooth student interaction and reduces expression interruption caused by waiting
Identification quality	Human review rate for high-concern signals	$\geq 95\%$	Prevents service omission risks caused by model misjudgment and strengthens professional review
Service connection	Referral completion time for medium- and high-concern cases	≤ 24 h	Improves the connection efficiency of counseling appointments, counselor follow-up, and professional support
Data security	Desensitization coverage of sensitive fields	100%	Protects student privacy and reduces leakage risks during data circulation
Experience feedback	Student service satisfaction	$\geq 85\%$	Reflects whether system responses are gentle, accurate, and acceptable
Iterative maintenance	Knowledge-base update cycle	Once/month	Maintains the timeliness of psychological knowledge, campus resources, and emergency procedures

Around the indicators listed in Table 1, system optimization should not remain at the level of algorithm-parameter adjustment; it should also absorb feedback from psychological teachers, counselors, and student representatives, incorporating high-frequency problems, misidentification cases, and invalid recommendation content into sample review. Especially at key stages such as freshman adaptation, graduation and employment, and exam-week pressure, service strategies should be adjusted with scenario changes, so that the agent can maintain technical stability while also grasping the real rhythm of campus life.

5 Conclusion

The deeper value of college student mental health services lies not only in discovering and responding to problems, but also in enabling students to feel support that is reachable, trustworthy, and sustainable amid the uncertainties of growth. The introduction of large-model agents endows psychological services more refined perceptual capacity and more flexible connection methods; however, what truly determines the quality of their application is the balance among professional ethics, educational warmth, and technological governance. Only by integrating intelligent tools within the developmental needs of human beings, transforming data capabilities into caring capabilities, and extending precise identification into long-term companionship can university mental health work preserve its due humanistic foundation amid digital transformation, while providing more stable, free and comprehensive support for students' growth.

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Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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