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Inclusive-Oriented, AI-Driven Mental Health Services for All Age Groups: Research on Challenges and Optimization Strategies

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Abstract

Against the background of the normalized and large-scale development of global mental health problems and the imbalance between supply and demand for mental health services in China, artificial intelligence (AI) technology provides a new pathway for achieving inclusivity in mental health services for all age groups. This study focuses on the development of an AI-driven intelligent agent for mental health detection and counseling services under an inclusive orientation. Based on an analysis of 107 valid samples collected through online questionnaires, the study systematically identifies core challenges, including low cognitive awareness and acceptance of AI mental health services among different demographics, shortcomings in service adaptability (e.g., operational difficulty, age-specific adaptation) and trust (e.g., privacy protection, accuracy of results), and the underexploration of potential mental health needs. Guided by the Hierarchy of Needs Theory, Social Support Theory, and Human-Machine Collaboration Theory, this paper proposes a dual-pillar framework for the agent's application, encompassing personalized psychological education and support across the entire lifespan—from childhood and adolescence to adulthood, the workplace, and old age—and deep empowerment of the educational ecosystem as embedded infrastructure for curriculum innovation, teacher training, and data-driven management decision-making. Furthermore, the paper rigorously analyzes the current limitations of the technology, including the depth of emotional interaction, professional competence boundaries, and challenges in ecological integration. It outlines targeted improvement directions involving multimodal affective computing, human-machine collaborative intervention networks, and advanced personalized adaptation. The study concludes with a future-oriented vision where AI-driven mental health support evolves from passive response to proactive prevention, ultimately functioning as a lifelong “Psychological Radar” and promoting absolute inclusivity in mental health education resources. The findings aim to provide practical references for grassroots mental health service institutions, relevant enterprises, and social organizations, promoting the deep integration of AI

technology with mental health services and contributing to the development of a more psychologically resilient society.

Keywords

inclusive orientation, artificial intelligence (AI), all age groups, educational empowerment

1. Introduction

At present, global mental health problems are showing a normalized and large-scale development trend, which has become an important public health issue affecting human health and social development. According to data released by the World Health Organization, by 2022, the number of people with mental illnesses in the world has exceeded 1 billion [1]. Among them, anxiety disorders and depressive disorders account for 31% and 28.9% respectively. For individuals aged 5 to 24, the disease burden caused by mental disorders is the highest among all types of diseases, accounting for 20.27% of the total disability-adjusted life years, which is much higher than other types of diseases.

Mental health problems in China are also prominent. Relevant data show that the scale of people with mental health problems in China has reached 200 million to 300 million, including more than 54 million depression patients. However, the overall treatment rate is only 9.5%, which is far lower than the average level of 50% in high-income countries.

From the perspective of specific groups, mental health problems of workplace groups are particularly significant. About 60% to 70% of people troubled by mental health problems in the world are workplace groups. The detection rate of mental problems such as anxiety, depression and occupational burnout among Chinese occupational groups has been increasing year by year, with the detection rate exceeding 30% in some high-pressure industries. Among them, the incidence of post-traumatic stress disorder among medical staff is three times that of the general population, the detection rate of anxiety and depression among teachers is as high as 40%, and the risk of depression among people who work more than 10 hours a day is 23% higher than that of the general population.

In terms of the elderly group, with the acceleration of China's aging process, the phenomenon of empty nests has become increasingly prominent. In addition, factors such as the decline of physiological functions and the change of social roles lead to frequent psychological distress. Relevant surveys show that the incidence of loneliness among Chinese elderly groups is more than 30%, and the detection rate of early symptoms of cognitive impairment is about 8.2%. However, the consultation rate of mental health problems among the elderly is less than 10%. Against this background, carrying out this research has important reference value.

2. Research Significance

2.1 Theoretical Significance

Combining the characteristics of mental health needs of different groups, this study sorts out the existing research results on the integration of digital technology and mental health services, analyzes the limitations and deficiencies in current research, integrates the theories of public health, psychology, digital technology and other related disciplines, and constructs a research framework of mental health services suitable for the needs of the whole population. It can provide clear research ideas and theoretical references for subsequent similar studies.

2.2 Practical Significance

Based on the mental health service needs of key groups such as workplace groups and the elderly, combined with the current situation of mental health service resource supply in China and the actual application of digital technology, this study explores the specific paths for the adaptation of digital technology and mental health services, and analyzes the application effects and existing problems of different service models. Its research conclusions can provide practical references for grass-roots mental health service institutions, relevant enterprises and social organizations to carry out mental health services.

3. Research Status of AI-Related Mental Health at Home and Abroad

3.1 Research Status of AI-Related Mental Health Abroad

At present, foreign research in the field of AI-driven mental health has entered a stage of diversified and refined development. Its core focuses on mental health state detection, early warning, personalized intervention and multi-scenario technology application. It relies on core technologies such as machine learning, multimodal AI and natural language processing, and has formed rich achievements combined with the needs of different groups of people and different scenarios.

Hasan J M et al. [1] conducted an in-depth exploration and systematic review of machine learning methods for mental health state detection. This study comprehensively sorted out the application scenarios, core advantages and existing technical bottlenecks of various machine learning algorithms in the field of mental health detection. It established a scientific methodological analysis framework, provided solid theoretical support and practical guidance for subsequent related research, and promoted the standardized and systematic application of machine learning technology in the field of mental health detection.

Saxena K A et al. [2] focused on the early detection of mental health conditions and proposed a multimodal generative AI method based on MI-GBF and fused three-branch network. By integrating multi-dimensional physiological and psychological data, this method effectively improved the accuracy and efficiency of early mental health abnormality identification. It broke through the limitations of traditional single-dimensional detection methods, provided a new technical path for the early detection and intervention of mental health problems, and had strong practical application potential.

Yang J et al. [3] put forward an improved scheme based on transfer learning and feature fusion to solve the problem of data imbalance in the application of large Transformer models in mental health detection. This scheme effectively alleviated the problem of data deviation in the process of model training, significantly improved the stability, generalization ability and detection accuracy of mental health detection models, and provided a practical technical solution for processing large-scale and multi-dimensional mental health data and optimizing the performance of detection models.

Biró A et al. [4] developed a prototype of a multimodal AI system for vitiligo detection and mental health monitoring, which innovatively combined skin disease detection with patients' mental health monitoring. Considering that patients with skin diseases are prone to psychological distress such as inferiority and anxiety, this system realized the coordinated monitoring of physical diseases and mental health. It broke the limitation of traditional single-field monitoring and further expanded the application boundary and scenario scope of AI in the field of mental health.

Agarwal J et al. [5] focused on the needs of mental health detection for specific groups, and built an exclusive detection model based on computer intelligence, which is specially used for screening the mental health status of people in Indian agricultural communities. Combined with the occupational characteristics, living environment and psychological pressure characteristics of people in agricultural communities, this study optimized the adaptability and detection accuracy of the model. It filled the research gap in the field of mental health detection for specific rural occupational groups and provided personalized technical tools for the mental health protection of specific grass-roots groups.

Kamdan K et al. [6] combined natural language processing (NLP) technology with chatbot systems, focused on the field of adolescent mental health, and realized the early detection of adolescent mental health and accurate identification of emotional states. This system adopted a chat interaction form that adolescents

are willing to accept, non-invasively captured the emotional characteristics and psychological changes in their language, took into account the accuracy, convenience and user acceptance of detection, and provided an efficient and feasible new way for the regular monitoring of adolescent mental health.

Pichowicz W et al. [7] carried out a special study on the core functions of mental health chatbot agents, focusing on evaluating their performance in the detection and management of suicidal ideation. This study systematically analyzed the effects and deficiencies of chatbots in identifying suicidal tendencies, providing preliminary intervention suggestions and guiding professional help. It provided important research basis and improvement direction for optimizing the psychological intervention ability of chatbots, improving the suicide prevention system and reducing the suicide rate.

Madanian S et al. [8] focused on the practical application of text analysis technology in depression detection, and deeply discussed the core value of this technology in the digital transformation of mental health. By extracting emotional characteristics and semantic tendencies from text information, the study built an efficient depression state identification model, realized the rapid and non-invasive detection of depression symptoms, and provided important technical support for promoting the digital, convenient and large-scale development of mental health services.

Mami M D et al. [9] innovatively took social media data as the core data source for mental health detection, and used AI technology to mine mental health-related characteristics from users' text and behavior data, building an exclusive model for the detection of depression and anxiety. This study provided a new idea and method for large-scale population mental health screening, greatly improved the coverage and efficiency of mental health screening, and at the same time triggered relevant discussions on user privacy protection and data security.

Zhao D et al. [10] broke through the limitations of traditional mental health detection technology, and carried out research on the development and application of microfluidic sweat detection technology in mental health monitoring. By detecting changes in physiological indicators in sweat, this technology indirectly reflects fluctuations in human mental state, realizing non-invasive, real-time and continuous monitoring of mental health. It injected new vitality into the diversified and intelligent development of mental health monitoring technology, and also provided a new choice for mental health monitoring of special groups.

In summary, the current foreign research on AI-related mental health shows distinct characteristics of diversified technology, refined population and diversified scenarios. Scholars have carried out in-depth research around technology optimization, accurate detection, personalized intervention and scenario expansion, forming a relatively complete research system. However, at the same time, there are still unsolved problems in this field, such as model generalization, privacy protection, adaptability to specific groups and the implementation of intervention effects. Future research will further focus on these core pain points and promote the standardized, large-scale and high-quality application of AI technology in the field of mental health.

3.2 Research Status of AI-Related Mental Health in China

Compared with foreign research, the research in the field of AI mental health in China is based on the actual needs of local people and the development of technology. It is gradually transforming from basic exploration and system development to technology optimization and scenario implementation. Its core focuses on the optimization of mental health detection architecture, the innovation of auxiliary diagnosis methods, the development of related systems and the integrated application of multiple scenarios, forming practical and targeted research achievements.

Xu Chuanming, Luo Lijiao and Zhang Bin [11] focused on the pain points of technology implementation in mental health detection, and carried out a special study on the optimization of edge intelligent computing architecture and real-time response mechanism. Aiming at the problems of slow response, high resource consumption and insufficient adaptability of traditional mental health detection architecture, this study optimized the edge intelligent computing architecture in a targeted manner and built an efficient real-time response mechanism. It effectively improved the speed and efficiency of mental health detection, reduced system resource consumption at the same time, provided solid technical support for the grass-roots

popularization and portable application of mental health detection technology, and promoted the in-depth integration of domestic edge intelligent technology and the field of mental health detection.

Qiao Huiyan, Duan Xuelong, Xie Chihao et al. [12] based on the actual needs of mental health auxiliary diagnosis, proposed an auxiliary diagnosis method for mental health based on outlier detection. This study focused on the mining and analysis of psychological sandplay data, extracted core features highly related to users' mental health status, built a virtual psychological sandplay dataset, integrated a variety of traditional outlier detection algorithms and designed a fusion strategy. It effectively improved the accuracy and efficiency of abnormal sample detection, could assist human experts to carry out more accurate mental health diagnosis, and provided a new idea and practical path for the innovation of domestic mental health auxiliary diagnosis technology.

He Xiaojing [13] focused on the integrated application of mental health services and clinical scenarios, and carried out a study on the application effect of psychological nursing combined with health education in pulmonary function testing. This study focused on the negative emotions such as anxiety and tension that are easy to appear in people undergoing pulmonary function testing, combined professional psychological nursing with targeted health education, observed its impact on the mental state and test cooperation of the tested people, and verified the positive effect of this model in relieving the negative emotions of the tested people and improving the detection efficiency and quality. It provided practical reference for the in-depth integration of mental health services and clinical medical scenarios, and promoted the extension of mental health intervention to segmented clinical scenarios.

Yan Zhicheng [14], as one of the early domestic scholars engaged in research related to mental health detection, focused on promoting the design and development of the national physical fitness and mental health detection system. Aiming at the deficiencies of domestic and foreign physical fitness and mental health detection systems at that time, this study designed and developed an integrated detection system based on the network environment, realizing the standardized and systematic management of national physical fitness and mental health detection and health consultation. It took into account the pertinence of detection and the humanization of management, laid the foundation for the iterative upgrading and large-scale application of subsequent domestic mental health detection systems, and filled the gap in system development in related fields at that time.

In summary, the current domestic research on AI-related mental health shows the characteristics of “technology optimization and implementation, accurate scenario adaptation, and equal emphasis on foundation and application”. Scholars have carried out targeted research around architecture optimization, diagnosis methods, system development and scenario integration, gradually narrowing the gap with the advanced foreign level. From the perspective of research history, domestic research has gradually transformed from early system development and basic application to core technology optimization and in-depth cultivation of segmented scenarios, paying more attention to the practicality and local adaptability of research achievements. However, there are still deficiencies in current domestic research. Compared with foreign countries, there is still room for improvement in multimodal technology innovation, large-scale data application, and refined research on specific groups. Future research will further focus on technology innovation and scenario implementation, and promote the high-quality development of the domestic AI mental health field.

4. Definition of Core Concepts

4.1 Mental Health

In this study, mental health, with reference to the definition of mental health by the World Health Organization (WHO) and combined with the relevant norms of China's Core Information for the Promotion of Mental Health Literacy, is defined as a dynamic balanced state where individuals can maintain a good emotional state and sound personality traits at the psychological level, possess normal cognitive ability, adaptability and interpersonal communication ability, correctly recognize their own value, properly handle various pressures in life and work, effectively regulate negative emotions, and achieve self-acceptance and social adaptation. It does not simply refer to the absence of mental illness. Its core evaluation dimensions include four aspects: emotional regulation ability, cognitive function integrity, interpersonal adaptability, and

social role adaptation ability, covering the common and personalized psychological characteristics of different groups such as workplace groups and the elderly, which is consistent with the research focus on the psychological distress of different groups in the previous research.

4.2 Mental Health Services

Combined with the supply and demand status of mental health services in the previous research, this study defines mental health services as a general term for a series of professional and systematic services provided by various subjects to meet the mental health needs of different groups. It covers multiple links such as the popularization of mental health knowledge, psychological problem screening, emotional support, psychological counseling, psychological intervention, and rehabilitation guidance. It is not limited to the diagnosis and treatment services provided by professional medical institutions, but also includes inclusive psychological services provided by grass-roots communities, enterprises and social organizations, as well as intelligent psychological services driven by digital technology. Its core characteristics are inclusiveness, pertinence and diversification. The service subjects include professional psychological workers, medical institutions, community service centers, enterprises, social organizations, etc. The service objects cover all types of groups with psychological needs mentioned earlier, such as workplace groups and the elderly, focusing on the accessibility and adaptability of services.

4.3 Digital Technology-Enabled Mental Health Services

Combined with the background of the integrated development of digital technology and mental health services mentioned earlier, this study defines digital technology-enabled mental health services as a service form that relies on digital technology means such as generative AI, multimodal perception technology, large language models and big data analysis to optimize and upgrade the service model, service content and service path of traditional mental health services, so as to realize the contactless, accurate and large-scale supply of mental health services. Its core connotation includes three levels: technology adaptation, demand matching and service optimization. Specifically, it realizes accurate screening of psychological problems, personalized emotional support and scenario-based consulting intervention through digital technology, solves the pain points of traditional mental health services such as shortage of resources, uneven regional coverage and difficulty in access, which is consistent with the core goal of this study to explore an inclusive and technology-adapted mental health service system.

4.4 Educational Empowerment

Educational empowerment defines the intelligent agent's functional role in ecosystem integration, moving beyond being a standalone tool to become infrastructure that enables the educational ecosystem. It involves deeply integrating the agent into educational scenarios such as curriculum teaching, teacher training, and parental schooling, providing systematic support to enhance the psychological literacy and educational capabilities of all participants (students, teachers, parents), thereby promoting the popularization, normalization, and personalization of psychological education.

4.5 Psychological Support

Psychological support summarizes the essential attribute of the service provided by the intelligent agent. It is a general term for a series of professional, systematic supportive activities, including mental health knowledge popularization, psychological problem screening, emotional counseling, and stress management. It is based on professional theories such as public health and psychology, facilitated by AI technology, and is clearly distinguished from clinical diagnosis and treatment, focusing on prevention, education, and development.

5. Theoretical Basis

Combined with the research theme and core content, this study selects relevant theories highly suitable for it as the research support. All theories are consistent with the previous research background and research significance, providing a solid theoretical basis for the research. At the same time, they provide theoretical guidance for the subsequent analysis of the mental health needs of different groups and the exploration of the

adaptation path between digital technology and mental health services, ensuring the scientificity and rigor of the research. All theoretical applications focus on reference value and do not involve expressions of promoting the development of relevant theories.

5.1 Hierarchy of Needs Theory

The Hierarchy of Needs Theory was proposed by Maslow. This theory holds that individual needs are divided into five levels: physiological needs, safety needs, love and belongingness needs, esteem needs, and self-actualization needs. The levels are progressive from low to high. When low-level needs are basically met, high-level needs will become the core pursuit of individuals. This study takes this theory as one of the core theoretical bases. Combined with the characteristics of the mental health needs of workplace groups and the elderly in the previous research, it is believed that mental health needs are an important part of individuals' love and belongingness needs and esteem needs. Due to differences in age, occupation and living environment, different groups have significant differences in the level and focus of their mental health needs. The mental health needs of workplace groups focus more on middle and high-level needs such as stress relief and professional value recognition, while the mental health needs of the elderly focus more on basic high-level needs such as a sense of belonging and security. This theory can provide theoretical reference for this study to analyze the differentiated characteristics of the mental health needs of different groups and construct a hierarchical and classified mental health service model, helping to clarify the core psychological demands of different groups and improve service adaptability.

5.2 Social Support Theory

Social Support Theory holds that an individual's mental health status is closely related to the acquisition of social support. Social support is an important support for individuals to cope with pressure, relieve negative emotions and maintain mental health. It mainly includes two types: formal social support (such as support provided by medical institutions, communities and enterprises) and informal social support (such as support provided by family, friends and colleagues). Adequate social support can effectively reduce the incidence of individual mental problems and improve individual psychological resilience. Combined with the current situation of insufficient supply of mental health services and unbalanced acquisition of social support among different groups in China mentioned in the previous research, this theory can provide theoretical reference for this study to explore the supply path of mental health services. Digital technology-enabled mental health services can be an important supplement to formal social support, making up for the shortcomings of insufficient coverage and inconvenient access of traditional social support, and providing convenient and efficient social support for workplace groups, the elderly and other groups, especially emotional companionship and psychological support for empty-nest elderly and isolated workplace groups who lack informal social support. At the same time, this theory can provide a theoretical basis for analyzing the causes of mental health problems of different groups and optimizing service content, and provide ideas for solving the problems of difficult access and poor adaptation of mental health services mentioned earlier.

5.3 Human-Machine Collaboration Theory

Human-Machine Collaboration Theory focuses on the collaborative interaction between humans and digital technology. This theory holds that digital technology is an auxiliary tool for human work and life, not a substitute for humans. Through reasonable division of labor and collaborative cooperation between humans and technology, complementary advantages can be achieved, and the efficiency and quality of work and services can be improved. The core is to achieve a dynamic balance of “humans adapting to technology and technology serving humans”. Combined with the background of the integrated development of digital technology and mental health services mentioned earlier, as well as the challenges such as algorithmic bias and digital divide faced by AI-driven mental health services, this theory provides important theoretical support for this study to explore the path of digital technology-enabled mental health services. This theory guides this study to clarify the collaborative relationship between digital technology and professional psychological workers: digital technology mainly undertakes repetitive and basic work such as psychological screening, basic emotional support and information push, while professional psychological workers focus on professional work such as complex psychological problem intervention and personalized counseling, realizing the combination of scale and accuracy of mental health services through human-machine

collaboration. At the same time, this theory can provide theoretical reference for solving problems such as the digital divide among the elderly and privacy protection of workplace groups, helping to optimize the aging-friendly design and privacy protection design of digital technology, improve the adaptability of technology to different groups, and conform to the core direction of this study to construct an inclusive and AI-driven mental health service system.

6. Analysis of Survey Results on AI-Driven Mental Health Services for All Age Groups Under the Inclusive Orientation

This survey focuses on AI-driven mental health detection and counseling services for all age groups under an inclusive orientation. It was conducted through an online questionnaire, with a total of 120 questionnaires distributed and 107 valid responses collected, resulting in an effective response rate of 89.17%. The survey sample covers groups of different ages and occupational statuses, with a particular emphasis on young working adults, middle-aged working adults, and the elderly, aligning closely with the core all-age group targeted by the study.

6.1 Basic Information Distribution of the Survey Sample

6.1.1 Age Group Distribution of the Sample

The survey sample is divided into three age groups: young working adults aged 18-35, middle-aged working adults aged 36-59, and the elderly aged 60 and above. The specific distribution is shown in Table 1.

Table 1: Age Group Distribution of the Sample

Age Group	Number of Valid Responses (People)	Percentage (%)	Group Characteristics Correspondence
18-35 (Young Working Adults)	53	49.53	Core workforce in the workplace, high internet access, with psychological stress mainly stemming from workplace competition
36-59 (Middle-aged Working Adults)	41	38.32	Backbone workforce in the workplace, balancing work and family, with diversified sources of psychological stress
60 and above (Elderly)	13	12.15	Retired or semi-retired, with low internet access, and psychological stress mainly stemming from loneliness and daily care

From Table 1, it can be seen that young working adults aged 18-35 constitute the largest group in this survey, with 53 valid responses accounting for 49.53%. As the core workforce in the workplace with high internet access, they are the main potential audience for AI-driven mental health services. Middle-aged working adults aged 36-59 have 41 valid responses, accounting for 38.32%. As the backbone workforce balancing work and family responsibilities, their sources of psychological stress are diversified. The elderly group aged 60 and above has 13 valid responses, accounting for 12.15%, which is relatively low mainly due to their lower proficiency in internet operations and weaker willingness to participate in online questionnaires. The age distribution of this sample covers core all-age groups with a reasonable proportion, providing reliable data support for subsequent age-specific survey analyses.

6.1.2 Occupational Status Distribution of the Sample

The survey sample is divided into four occupational status categories: employed in enterprises/institutions, self-employed, retired, and others. The specific distribution is shown in Table 2.

Table 2: Occupational Status Distribution of the Sample

Occupational Status	Number of Valid Responses (People)	Percentage (%)	Corresponding Age Groups
Employed in Enterprises/Institutions	30	28.04	Mainly working adults aged 18-59
Self-employed	31	28.97	Mainly working adults aged 18-59
Retired	23	21.50	Mainly the elderly aged 60 and above
Others	23	21.50	Including unemployed individuals and

			students, covering various age groups

From Table 2, it can be seen that employed individuals in enterprises/institutions and self-employed individuals are the core occupational groups in this survey, with similar proportions. Among them, 30 employed individuals in enterprises/institutions have valid responses, accounting for 28.04%, and 31 self-employed individuals have valid responses, accounting for 28.97%. Both groups mainly correspond to working adults aged 18-59, which is consistent with the age group distribution data mentioned earlier and can reflect the overall characteristics of working adults. Retired individuals have 23 valid responses, accounting for 21.50%, mainly corresponding to the elderly group aged 60 and above, with their occupational status highly matching their age characteristics, which can accurately reflect the relevant demands of the elderly. The "others" category has 23 valid responses, accounting for 21.50%, including unemployed individuals and students, covering various age groups, further enriching the sample structure, reducing survey biases caused by a single occupational group, and enhancing the comprehensiveness of the sample.

6.2 Analysis of Core Survey Question Results

The core survey questions focus on three key dimensions: awareness and acceptance, service adaptability and trust, and demands and preferences. A 1-5 point scale is used for scoring, where 1 indicates "completely disagree" and 5 indicates "completely agree". Through the number of responses and percentage data for each option, the specific attitudes of all-age groups are precisely presented. Each survey question is accompanied by a separate table and analysis, without a centralized comprehensive analysis.

6.2.1 Analysis of the Awareness and Acceptance Dimension

The awareness and acceptance dimension includes three core survey questions, focusing on investigating the awareness level, usage willingness, and acceptance willingness of all-age groups regarding AI-driven mental health detection and counseling services. The corresponding tables and independent analyses for each core question are as follows.

(1) Awareness of AI-driven Mental Health Detection Services

The survey question is "I am aware that AI can provide mental health detection services (such as emotion assessment and psychological state screening)." The specific survey results are shown in Table 3.

Table 3: Awareness of AI-driven Mental Health Detection Services

Score Option	Number of Valid Responses (People)	Percentage (%)	Attitude Tendency
1 (Completely Disagree)	52	48.60	Completely unaware that AI can provide mental health detection services
2 (Disagree)	18	16.82	Not very aware that AI can provide mental health detection services
3 (Neutral)	18	16.82	Vague awareness of AI-driven mental health detection services
4 (Agree)	14	13.08	Relatively aware that AI can provide mental health detection services
5 (Completely Agree)	5	4.67	Completely aware that AI can provide mental health detection services

From Table 3, it can be seen that the overall awareness level of all-age groups regarding AI-driven mental health detection services is relatively low. Among them, 52 respondents chose 1 (completely disagree), accounting for 48.60%, and 18 respondents chose 2 (disagree), accounting for 16.82%. Together, they account for 65.42%, indicating that over 60% of respondents lack awareness of this service. Eighteen respondents chose 3 (neutral), accounting for 16.82%, showing a vague awareness of the service. Fourteen respondents chose 4 (agree) and 5 respondents chose 5 (completely agree), accounting for 13.08% and 4.67% respectively, with only a small number of respondents clearly aware of the mental health detection services that AI can provide. This data indicates that the current popularization of knowledge about AI-driven mental health detection services is insufficient, failing to effectively reach all-age groups.

(2) Willingness to Use AI-driven Mental Health Detection Tools

The survey question is “If there is a need, I am willing to try using AI-driven mental health detection tools.” The specific survey results are shown in Table 4.

Table 4: Willingness to Use AI-driven Mental Health Detection Tools

Score Option	Number of Valid Responses (People)	Percentage (%)	Willingness Tendency
1 (Completely Disagree)	25	23.36	Completely unwilling to try AI detection tools
2 (Disagree)	23	21.50	Not very willing to try AI detection tools
3 (Neutral)	35	32.71	Neutral attitude towards trying AI detection tools
4 (Agree)	13	12.15	Relatively willing to try AI detection tools
5 (Completely Agree)	11	10.28	Completely willing to try AI detection tools

From Table 4, it can be seen that the overall willingness of all-age groups to use AI-driven mental health detection tools is at a moderately low level. A total of 48 respondents chose 1 (completely disagree) and 2 (disagree), accounting for 44.86%, indicating that nearly half of the respondents explicitly expressed their unwillingness to try such tools. Thirty-five respondents chose 3 (neutral), accounting for 32.71%, showing a neutral attitude without a clear willingness. A total of 24 respondents chose 4 (agree) and 5 (completely agree), accounting for 22.43%, with only a small number of respondents explicitly expressing their willingness to try. This result indicates that most respondents have concerns about AI-driven mental health detection tools and have not formed a positive willingness to use them, which is consistent with the previous survey result of low awareness and may also be related to respondents' concerns about the accuracy of the tools and privacy protection.

(3) Willingness to Accept Mental Health Counseling through AI Platforms

The survey question is “I am willing to receive mental health counseling through AI platforms.” The specific survey results are shown in Table 5.

Table 5: Willingness to Accept Mental Health Counseling through AI Platforms

Score Option	Number of Valid Responses (People)	Percentage (%)	Willingness Tendency
1 (Completely Disagree)	17	15.89	Completely unwilling to receive counseling through AI platforms
2 (Disagree)	37	34.58	Not very willing to receive counseling through AI platforms
3 (Neutral)	27	25.23	Neutral attitude towards receiving counseling through AI platforms
4 (Agree)	14	13.08	Relatively willing to receive counseling through AI platforms
5 (Completely Agree)	12	11.21	Completely willing to receive counseling through AI platforms

From Table 5, it can be seen that the overall acceptance willingness of all-age groups for mental health counseling through AI platforms is relatively low. A total of 54 respondents chose 1 (completely disagree) and 2 (disagree), accounting for 50.47%, indicating that over half of the respondents explicitly expressed their unwillingness to receive mental health counseling through AI platforms. Twenty-seven respondents chose 3 (neutral), accounting for 25.23%, showing a neutral attitude without a clear acceptance. A total of 26 respondents chose 4 (agree) and 5 (completely agree), accounting for 24.29%, with only a small number of respondents explicitly expressing their willingness to accept. Compared with the willingness to use AI-driven mental health detection tools, the acceptance willingness for this type of service is slightly higher but still at a low level overall. The core reason is that respondents have concerns about the professionalism and pertinence of AI counseling, and privacy protection issues may also affect their acceptance willingness.

6.2.2 Analysis of the Service Adaptability and Trust Dimension

The service adaptability and trust dimension includes four core survey questions, focusing on investigating the evaluations of all-age groups regarding the operational difficulty adaptability, detection

result accuracy, and privacy protection ability of AI mental health services, as well as their demands for age-specific adaptability. The corresponding tables and independent analyses for each core question are as follows.

(1) Evaluation of the Operational Difficulty Adaptability of AI Detection Tools

The survey question is "I believe that the operational difficulty of AI detection tools is suitable for my age group." The specific survey results are shown in Table 6.

Table 6: Evaluation of the Operational Difficulty Adaptability of AI Detection Tools

Score Option	Number of Valid Responses (People)	Percentage (%)	Evaluation Tendency
1 (Completely Disagree)	30	28.04	Completely believe that the operational difficulty is not suitable for their age group
2 (Disagree)	34	31.78	Not very believe that the operational difficulty is suitable for their age group
3 (Neutral)	10	9.35	Vague evaluation of the operational difficulty adaptability
4 (Agree)	21	19.63	Relatively believe that the operational difficulty is suitable for their age group
5 (Completely Agree)	12	11.21	Completely believe that the operational difficulty is suitable for their age group

From Table 6, it can be seen that the overall evaluation of all-age groups regarding the operational difficulty adaptability of AI detection tools is relatively low. A total of 64 respondents chose 1 (completely disagree) and 2 (disagree), accounting for 59.81%, indicating that nearly 60% of respondents believe that the operational difficulty of such tools is not suitable for their age group. Ten respondents chose 3 (neutral), accounting for 9.35%, showing a vague evaluation without a clear judgment. A total of 33 respondents chose 4 (agree) and 5 (completely agree), accounting for 30.84%, with only 30% of respondents believing that the operational difficulty is suitable for their age group. This result indicates that the current operational difficulty of AI mental health detection tools has not achieved adaptability for all age groups. The elderly generally believe that the operational difficulty is too high due to their weaker digital operation abilities, and some working groups believe that the operational process is cumbersome. Inadequate adaptability will affect the inclusive implementation of the services.

(2) Evaluation of the Trust in the Accuracy of AI Detection Results

The survey question is "I am concerned that the mental health results detected by AI are not accurate and reliable." The specific survey results are shown in Table 7.

Table 7: Evaluation of the Trust in the Accuracy of AI Detection Results

Score Option	Number of Valid Responses (People)	Percentage (%)	Trust Tendency
1 (Completely Disagree)	36	33.64	Completely not concerned about the result accuracy, with high trust
2 (Disagree)	16	14.95	Not very concerned about the result accuracy, with relatively high trust
3 (Neutral)	25	23.36	Neutral attitude towards the result accuracy trust
4 (Agree)	24	22.43	Relatively concerned about the result accuracy, with low trust
5 (Completely Agree)	6	5.61	Completely concerned about the result accuracy, with extremely low trust

From Table 7, it can be seen that the trust in the accuracy of AI detection results among all-age groups shows a differentiated characteristic. A total of 52 respondents chose 1 (completely disagree) and 2 (disagree), accounting for 48.59%, indicating that nearly half of the respondents are not concerned about the result accuracy and have relatively high trust. Twenty-five respondents chose 3 (neutral), accounting for 23.36%, showing a neutral attitude towards the result accuracy trust without a clear stance. A total of 30 respondents chose 4 (agree) and 5 (completely agree), accounting for 28.04%, indicating that over one-fourth of the respondents have concerns about the result accuracy and have low trust. This result indicates that the current accuracy of AI mental health detection results has not been widely recognized by all-age groups.

Some respondents' trust concerns mainly stem from the insufficient application maturity of AI technology in the mental health field, which will also affect their willingness to use the services.

(3) Evaluation of the Trust in the Privacy Protection Ability of AI Counseling Services

The survey question is "I believe that the privacy protection ability of AI counseling services is trustworthy." The specific survey results are shown in Table 8.

Table 8: Evaluation of the Trust in the Privacy Protection Ability of AI Counseling Services

Score Option	Number of Valid Responses (People)	Percentage (%)	Trust Tendency
1 (Completely Disagree)	42	39.25	Completely do not trust the privacy protection ability
2 (Disagree)	24	22.43	Not very trust the privacy protection ability
3 (Neutral)	12	11.21	Neutral attitude towards the privacy protection ability trust
4 (Agree)	18	16.82	Relatively trust the privacy protection ability
5 (Completely Agree)	11	10.28	Completely trust the privacy protection ability

From Table 8, it can be seen that the overall trust in the privacy protection ability of AI counseling services among all-age groups is relatively low, which is the lowest among all core survey questions. A total of 66 respondents chose 1 (completely disagree) and 2 (disagree), accounting for 61.68%, indicating that over 60% of respondents do not trust or have low trust in the privacy protection ability. Twelve respondents chose 3 (neutral), accounting for 11.21%, showing a neutral attitude towards the privacy protection ability trust. A total of 29 respondents chose 4 (agree) and 5 (completely agree), accounting for 27.10%, with only a small number of respondents expressing trust in the privacy protection ability. Mental health counseling involves personal privacy information, and respondents' untrusting attitude mainly stems from concerns about AI technology's privacy encryption ability and data storage security. This issue will directly restrict the promotion and implementation of AI mental health counseling services and affect their inclusiveness.

(4) Evaluation of the Demands for Age-Specific Adaptability in Usage Habits

The survey question is "I believe that AI mental health services need to strengthen adaptability to the usage habits of different age groups (such as operational guidance for the elderly and fragmented services for the working population)." The specific survey results are shown in Table 9.

Table 9: Evaluation of the Demands for Age-Specific Adaptability in Usage Habits

Score Option	Number of Valid Responses (People)	Percentage (%)	Demand Tendency
1 (Completely Disagree)	40	37.38	Completely believe that there is no need to strengthen age-specific adaptability
2 (Disagree)	31	28.97	Not very believe that there is a need to strengthen age-specific adaptability
3 (Neutral)	14	13.08	Vague cognition of the demand for strengthening age-specific adaptability
4 (Agree)	15	14.02	Relatively believe that there is a need to strengthen age-specific adaptability
5 (Completely Agree)	7	6.54	Completely believe that there is a need to strengthen age-specific adaptability

From Table 9, it can be seen that the overall cognition of all-age groups regarding the demand for strengthening adaptability to the usage habits of different age groups is relatively low. A total of 71 respondents chose 1 (completely disagree) and 2 (disagree), accounting for 66.35%, indicating that over 60% of respondents believe that there is no or little need to strengthen age-specific adaptability. Fourteen respondents chose 3 (neutral), accounting for 13.08%, showing a vague cognition without a clear stance on the adaptability demand. A total of 22 respondents chose 4 (agree) and 5 (completely agree), accounting for 20.56%, with only a small number of respondents explicitly believing that there is a need to strengthen adaptability. This result not only reflects the current inadequate adaptability of AI mental health services, leading some respondents to not realize the importance of adaptability, but also shows that most respondents

pay little attention to the adaptability demands of different age groups, which is not conducive to the inclusive coverage of the services for all age groups.

6.2.3 Analysis of the Demands and Preferences Dimension

The demands and preferences dimension includes seven core survey questions, focusing on investigating the counseling demands, stress sources, and service preferences of all-age groups. The corresponding tables and independent analyses for each core question are as follows.

(1) Investigation of the Demand for Mental Health Counseling

The survey question is "I have a demand for mental health counseling services." The specific survey results are shown in Table 10.

Table 10: Investigation of the Demand for Mental Health Counseling

Score Option	Number of Valid Responses (People)	Percentage (%)	Demand Tendency
1 (Completely Disagree)	24	22.43	Completely have no demand for mental health counseling
2 (Disagree)	41	38.32	Not very have a demand for mental health counseling
3 (Neutral)	20	18.69	Unclear demand for mental health counseling
4 (Agree)	15	14.02	Relatively have a demand for mental health counseling
5 (Completely Agree)	7	6.54	Completely have a demand for mental health counseling

From Table 10, it can be seen that the overall demand for mental health counseling among all-age groups is relatively low. A total of 65 respondents chose 1 (completely disagree) and 2 (disagree), accounting for 60.75%, indicating that over 60% of respondents indicate that they have no or little demand for mental health counseling. Twenty respondents chose 3 (neutral), accounting for 18.69%, showing an unclear demand cognition. A total of 22 respondents chose 4 (agree) and 5 (completely agree), accounting for 20.56%, with only a small number of respondents explicitly expressing a counseling demand. This result is related to the psychological states of different groups. Some respondents do not realize that their psychological stress requires professional counseling intervention, and it may also be related to the insufficient popularization of traditional mental health counseling, indirectly indicating that there is certain market potential to be explored for AI mental health counseling services.

(2) Investigation of the Stress Sources Related to the Workplace

The survey question is "My main psychological stress comes from workplace competition and workload." The specific survey results are shown in Table 11.

Table 11: Investigation of the Stress Sources Related to the Workplace

Score Option	Number of Valid Responses (People)	Percentage (%)	Stress Tendency
1 (Completely Disagree)	24	22.43	Completely have no stress from workplace competition and workload
2 (Disagree)	31	28.97	Not very have stress from workplace competition and workload
3 (Neutral)	15	14.02	Stress from workplace competition and workload is not obvious
4 (Agree)	15	14.02	Relatively have stress from workplace competition and workload
5 (Completely Agree)	22	20.56	Completely have stress from workplace competition and workload

From Table 11, it can be seen that the workplace-related psychological stress among all-age groups shows a differentiated characteristic. A total of 55 respondents chose 1 (completely disagree) and 2 (disagree), accounting for 51.40%, indicating that over half of the respondents indicate that they have no or little stress from workplace competition and workload. These respondents are mainly retired groups and some

unemployed groups. Fifteen respondents chose 3 (neutral), accounting for 14.02%, showing that their workplace stress is not obvious, mostly groups with a relatively relaxed work rhythm. A total of 37 respondents chose 4 (agree) and 5 (completely agree), accounting for 34.58%, indicating that over one-third of the respondents explicitly express that they have workplace-related stress. These respondents are mainly working adults aged 18-59, which is consistent with the previous age and occupational distribution data, highlighting that one of the core stress sources for working groups is workplace competition and workload.

(3) Investigation of the Stress Sources Related to Daily Life

The survey question is "My main psychological stress comes from daily care and loneliness." The specific survey results are shown in Table 12.

Table 12: Investigation of the Stress Sources Related to Daily Life

Score Option	Number of Valid Responses (People)	Percentage (%)	Stress Tendency
1 (Completely Disagree)	37	34.58	Completely have no stress from daily care and loneliness
2 (Disagree)	20	18.69	Not very have stress from daily care and loneliness
3 (Neutral)	20	18.69	Stress from daily care and loneliness is not obvious
4 (Agree)	15	14.02	Relatively have stress from daily care and loneliness
5 (Completely Agree)	15	14.02	Completely have stress from daily care and loneliness

From Table 12, it can be seen that the overall daily life-related psychological stress among all-age groups is relatively mild. A total of 57 respondents chose 1 (completely disagree) and 2 (disagree), accounting for 53.27%, indicating that over half of the respondents indicate that they have no or little stress from daily care and loneliness. These respondents are mainly young working groups and middle-aged groups with complete family structures. Twenty respondents chose 3 (neutral), accounting for 18.69%, showing that their daily life-related stress is not obvious and has not formed a significant trouble. A total of 30 respondents chose 4 (agree) and 5 (completely agree), accounting for 28.04%, mainly including elderly groups and some middle-aged groups who need to take care of their families. The stress of the elderly mainly stems from loneliness, and the stress of the middle-aged mainly stems from daily care responsibilities, which is highly consistent with the daily life characteristics of different groups.

7. Core Research Problems Based on Survey Results

7.1 Low Cognition of AI Mental Health Services Among All-Age Groups

The survey data in the previous sections clearly shows that the overall cognition level of all-age groups regarding AI-driven mental health detection services is relatively low. Among the respondents, 52 (48.60%) stated they completely did not understand such services, and 18 (16.82%) reported they did not understand them very well. Together, these two groups account for 65.42%, meaning over 60% of respondents lack basic knowledge of mental health detection services provided by AI. In contrast, only 14 respondents (13.08%) said they understood the services relatively well, and 5 (4.67%) reported complete understanding, with the total proportion of these two groups being only 17.75%. Only a small number of respondents clearly recognized the application of AI in mental health detection. Currently, there is an obvious gap in the cognition of all-age groups regarding AI mental health services, and a comprehensive, clear understanding has not been formed, which constitutes a distinct cognitive issue.

7.2 Low Willingness to Accept AI Mental Health Services Among All-Age Groups

According to the survey results, the overall willingness of all-age groups to accept AI mental health services is relatively low, which is reflected in both willingness to use and willingness to consult. Regarding

the use of AI-driven mental health detection tools, 25 respondents (23.36%) said they were completely unwilling to try, and 23 (21.50%) were not very willing, accounting for 44.86% in total—nearly half of the respondents explicitly refused to try such tools. Only 13 respondents (12.15%) were relatively willing to try, and 11 (10.28%) were completely willing, with the total proportion of willing respondents being only 22.43%. In terms of accepting mental health counseling through AI platforms, 17 respondents (15.89%) were completely unwilling, and 37 (34.58%) were not very willing, accounting for 50.47% in total—over half of the respondents explicitly refused to receive counseling via AI platforms. Only 26 respondents clearly expressed willingness to accept such services, indicating an overall low acceptance level.

7.3 Shortcomings in Adaptability and Trust of AI Mental Health Services

The survey data reflects prominent problems in the adaptability and trust of AI mental health services. In terms of adaptability, 30 respondents (28.04%) believed the operational difficulty of AI detection tools was completely incompatible with their age group, and 34 (31.78%) thought it was not very compatible, accounting for 59.81% in total. Nearly 60% of respondents recognized that the operational difficulty of current AI detection tools did not match their age group, highlighting the issue of insufficient adaptability. In terms of trust, confidence in privacy protection was the lowest: 42 respondents (39.25%) completely did not trust the privacy protection capabilities of AI counseling services, and 24 (22.43%) did not trust them very much, accounting for 61.68% in total. Meanwhile, trust in the accuracy of detection results was divided: 24 respondents (22.43%) were relatively worried about result accuracy, and 6 (5.61%) were completely worried, accounting for 28.04% in total. Some respondents had obvious concerns about the reliability of detection results, and shortcomings in adaptability and trust have been clearly identified.

7.4 Underexplored Potential Mental Health Needs of All-Age Groups

The previous survey results show that the overall demand for mental health counseling among all-age groups is relatively low. Among the respondents, 24 (22.43%) said they had no counseling needs at all, and 41 (38.32%) had little need, accounting for 60.75% in total. Over 60% of respondents did not clearly express a demand for mental health counseling, and only 22 (20.56%) explicitly stated they had such needs. At the same time, the sources of psychological stress varied among different groups: 34.58% of workplace groups faced stress related to workplace competition and workload, while 28.04% of elderly groups and some middle-aged groups experienced stress related to daily care and loneliness. However, some respondents did not realize their psychological stress required professional counseling and intervention, indicating significant potential mental health needs that have not been effectively explored. There is a gap in the connection between these needs and existing services.

8. Core Design and Implementation of the MOOD Agent

The MOOD agent is built on top of large model APIs. It interacts with users to analyze their moods and conduct keyword searches, thus offering them assistance. It can be seen as a basic psychological support assistant with risk alert functions and a hybrid architecture. Lacking the ability of autonomous learning, it is an agent that combines a rule engine with large models. Its structured workflows ensure stability, security and controllability.

This psychological support agent is developed with Python and the Flask framework. Its core code features clear logic, working like a well-organized team: some parts handle user interaction, some store conversation history, some carry out security checks, and some generate professional responses. All components cooperate to complete the whole psychological support process.

It adopts a modular design, dividing different functions into separate files. Sensitive information and parameters are stored in configuration files; the agent's role and interaction rules are defined in keyword files; web interaction and core logic are processed in the main program file. Just like functional modularization, modifying one part will not affect others, making the system easy to understand and maintain.

MOOD first uses a dialogue memory algorithm. It allocates a specific storage space for each user's conversation history and only keeps the latest 10 messages. This sliding window method ensures coherent dialogue and reduces memory usage, solving practical problems through data structures. Second, it has a

crisis detection algorithm based on keyword matching. High-frequency dangerous words related to severe mental conditions, such as “suicide” and “self-harm”, are predefined. If a user’s input contains such words, a crisis alert will be triggered. This simple algorithm boasts high reliability, making it ideal for mental health scenarios where it is better to raise a false alert than miss a potential risk. Finally, its AI response generation algorithm is designed to retain no record of conversations beyond the latest six rounds. It packages pre-set rule-based prompts, the latest six dialogue turns and the user’s new input to send to the AI, while setting a low temperature parameter to make responses more stable and professional. In essence, it leverages existing AI APIs for natural language interaction, without the need to train complex models independently.

The overall workflow is straightforward. When a user sends a message on the web, the system first checks if the input is empty, then retrieves the user’s conversation history and scans for risky content. It then calls the AI to generate a response. If a crisis is detected – that is, the input contains pre-stored keywords – emergency help information will be added. Finally, the system updates the conversation history and returns the result. In short, the entire agent is developed based on Python, data structures and basic knowledge of web interaction.

9. Optimization Countermeasures of AI-Driven All-Age Mental Health Services Under the Inclusive Orientation

9.1 Popularize Knowledge of AI Mental Health Services and Improve Cognition

To address the low cognition of AI mental health services among all-age groups, it is necessary to build a multi-channel, hierarchical knowledge popularization system to break cognitive barriers, enhance group understanding of the services, and lay a cognitive foundation for service promotion and implementation. Focus on the basic functions, application scenarios, technical advantages, and usage processes of AI mental health detection and counseling services. Simplify professional terminology according to the cognitive characteristics of different groups, and convey core knowledge in simple and understandable language. Emphasize clarifying misunderstandings such as “AI mental health services are only for people with mental illnesses” and “AI detection results can replace professional diagnosis,” clarify the auxiliary positioning of AI services, and help groups establish scientific cognition.

Build diversified popularization channels tailored to the information acquisition habits of different age groups to achieve full coverage. For the 18-59-year-old workplace group, push popular science articles, animation videos, and case analyses through internal enterprise training, workplace communities, short video platforms, and official WeChat accounts to adapt to their fragmented reading habits. For the elderly aged 60 and above, conduct offline popular science lectures and hands-on teaching activities in cooperation with communities and nursing homes, supplemented by paper manuals and voice broadcasts to reduce information access barriers.

Collaborate with medical institutions, psychological service organizations, and social groups to carry out public welfare popular science activities and expand coverage. Establish a long-term popularization mechanism to regularly update content, and focus on promoting knowledge for weak cognitive areas based on survey feedback. Encourage professional psychological workers and AI technology practitioners to participate in popular science communication to improve the professionalism and credibility of content. Gradually enhance the cognitive level of all-age groups regarding AI mental health services, enabling more people to understand and recognize the value of these services.

9.2 Optimize AI Psychological Services and Improve Group Acceptance Willingness

To address the low willingness to accept AI mental health services, the core is to eliminate group concerns and gradually improve acceptance and usage willingness by optimizing service content, simplifying processes, and enhancing practicality. Optimize service content design to match the psychological needs of different groups, ensuring precision and relevance. For workplace groups, focus on developing modules for stress relief, emotional regulation, and occupational burnout intervention, and offer fragmented service durations to adapt to their tight work rhythms. For the elderly, prioritize core needs such as loneliness companionship, emotional counseling, and cognitive function training, optimize service interfaces and interaction methods, and add convenient functions such as voice guidance and one-click calls.

Enrich service forms by integrating text, voice, and video, provide personalized recommendations, break the limitations of single service models, and improve user experience. Simplify the operation processes of AI detection tools and consultation platforms to lower usage thresholds for all groups. Optimize interfaces, reduce unnecessary steps, strengthen aging-friendly designs for the elderly, and launch mini-program and APP quick access for workplace groups to achieve "one-click login and quick use." Provide full-process operational guidance through voice prompts and pop-up instructions to help users of different ages and operational abilities use the services smoothly, eliminating the core concern of "complex operation and inability to use."

Carry out free trials and experience activities to allow groups to personally perceive the advantages of AI services. Collect trial feedback to promptly optimize service shortcomings, and enhance persuasiveness through real case sharing and user reviews. Alleviate concerns about service effectiveness and practicality, gradually improving the willingness of all-age groups to accept AI mental health services and encouraging more people to actively try them.

9.3 Optimize Service Adaptability and Improve Group Trust

To address the prominent issues of insufficient adaptability and low trust, efforts should focus on adaptability upgrading and trust system construction to make up for service shortcomings, enhance group recognition and trust, and promote inclusive service implementation. Optimize service adaptability based on the usage habits and needs of different age groups to achieve precise matching for all ages and solve the pain point of poor operational adaptability.

Establish a special optimization team based on feedback from different age groups in the survey. For the elderly, optimize the aging-friendly design of AI detection tools and consultation platforms by adding functions such as font size adjustment, voice broadcasts, and simple operation guides to match their digital skills. For workplace groups, simplify processes and launch quick service access to adapt to fragmented usage needs and save time costs. Establish a dynamic adjustment mechanism for service adaptability to regularly collect user feedback, identify adaptability gaps, and continuously optimize service details to better meet the needs of all age groups.

Build a sound trust system centered on privacy protection and detection accuracy to strengthen user confidence. Strictly comply with data security laws and regulations, adopt technical measures such as encrypted storage and hierarchical permission management, standardize the collection, storage, use, and destruction of user privacy information, clarify privacy protection responsibilities, and disclose protective measures to eliminate concerns about privacy leakage. Strengthen the research and development and calibration of AI detection technology, cooperate with professional psychological and medical institutions to optimize algorithm models, and improve the accuracy and reliability of results. Clarify the auxiliary positioning of AI detection results, mark reference ranges, and provide interpretation services to help users understand the significance of results. Establish a service quality supervision mechanism to conduct regular inspections, disclose results and user reviews, and accept social supervision. Gradually enhance the trust of all-age groups in AI mental health services.

9.4 Identify Psychological Needs and Promote the Conversion of Potential Needs

To address the underexplored potential mental health needs and the gap between needs and services, it is necessary to comprehensively identify needs, strengthen guidance, and build connection bridges to accurately capture potential needs, promote their conversion into actual demands, and achieve precise matching between services and needs. Conduct comprehensive investigations of mental health needs across all-age groups through multiple channels such as communities, enterprises, nursing homes, and online questionnaires, covering groups of different ages, occupations, and living conditions.

Based on the differentiated stress sources identified in the survey, focus on investigating the workplace-related needs of professional groups (e.g., competition and workload) and the daily care and loneliness-related needs of the elderly and some middle-aged groups. Establish a mental health needs database to record demand types, intensity, and service preferences, enabling accurate identification of potential needs. Strengthen demand guidance by popularizing mental health knowledge and sharing cases to help users recognize that psychological stress requires professional intervention. Address misunderstandings such as

"psychological problems do not require consultation" and "seeking consultation means having a mental illness," and foster scientific mental health awareness to enhance proactive service-seeking behavior.

Provide personalized guidance for different groups: emphasize stress relief and burnout intervention for workplace groups, and loneliness counseling and cognitive function protection for the elderly to awaken potential needs. Build bridges between needs and AI mental health services by optimizing service content and forms based on survey results to launch modules matching potential needs. Establish a dynamic demand feedback mechanism to regularly update the database, track changes, and adjust service strategies. Smooth feedback channels to encourage users to actively share needs and experiences, continuously optimize services, and promote the conversion of potential needs into actual usage. Ensure AI mental health services truly meet the psychological needs of all-age groups and enhance their inclusiveness and effectiveness.

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