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Is AI healthcare a blessing or a curse? An Exploratory Study on the Chinese Public's Willingness to Use AI in Medical Treatment and Its Determinants Based on Computational Grounded Theory

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Abstract: *Using a mixed-method approach grounded in social cognitive theory and computational grounded theory, this study systematically analyzes the Chinese public's willingness to use AI-driven medical technology and the factors shaping public perceptions from a health communication perspective. A diverse dataset was gathered through surveys and semi-structured interviews, employing a mixed-methods approach that integrated qualitative and quantitative analyses to develop a theoretical framework, thematic clustering analysis, and an emotional mapping of the public's willingness to use AI-driven medical technology and its determinants. Additionally, a mixed-method evaluation framework was employed to validate responses and assess five core categories, eight subcategories, and twenty-three concepts within the theoretical model. The high evaluation score across three analytical dimensions, with a score of 92.3, validated the robustness of the research methodology. Findings indicate that cognitive perceptions, practical engagement, evaluative judgments, feedback mechanisms, and social context influence the public's willingness to use AI-driven medical technologies. These factors manifest in preconceived notions of AI in healthcare, diverse emotional associations, direct experiential interactions, and evolving expectations. These findings offer valuable insights for policy formulation and technological advancement in AI-driven medical services, with potential implications for healthcare practices in China and globally.*

Keywords: *AI Medical Treatment, Social Cognition, Computational Grounded Theory, Health Communication, Hybrid Method*

1. Introduction

In November 2022, the National Health Commission of China released the "14th Five-Year Plan for National Health Informatization," which proposed promoting and applying intelligent diagnosis systems in primary healthcare at the local level. In February 2023, the General Office of the CPC Central Committee and The General Office of the State Council jointly issued the "Opinions on Further Deepening Reform to Promote the Healthy Development of the Rural Medical and Health System," which outlined requirements for accelerating the deployment and application of AI-assisted diagnostic systems in rural medical institutions. On March 11, 2023, the first meeting of the 14th National Committee of the Chinese People's Political Consultative Conference was held, and committee member Yan Ying suggested expanding payment options including fee catalogs, medical insurance, and commercial insurance, as well as accelerating the application of AI medical products. Led by local medical insurance departments, comprehensive and actionable processes are being developed for AI products in insurance, with streamlined methods and standards for efficient filing and approval to reduce costs effectively. On September 12, 2023, the National Health Commission of China responded to the proposal on "Accelerating the Application of AI-Assisted Diagnosis and Improving the Level of Primary Medical and Health Services" at the first meeting of the 14th National Committee of the Chinese People's Political Consultative Conference, stating that AI medical products have applications in various medical segments, such as medical imaging and auxiliary diagnosis, and their role has become increasingly prominent." Moreover, the National Medical Insurance Administration has continuously reformed and optimized regulation of new pricing projects, guided local governments to streamline the application

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process for new pricing projects, and accelerated the review and acceptance process. These initiatives have generated significant public interest, with AI-driven healthcare emerging as a prominent topic.

2. Literature review

2.1 Research background and significance

China's medical resources are unevenly distributed, with high-quality medical resources mainly concentrated in large cities, while remote areas experience a shortage of medical resources. The application of AI medical technology can overcome geographical restrictions by leveraging networking and information technology to deliver convenient and efficient medical services to the wider public. AI medical technology can not only provide patients with accurate and efficient diagnosis and treatment services, but also enhance public health literacy and self-care capacity through consultations, health management strategies, and other means. At the same time, health communication research continues to evolve, introducing new methods and strategies. This study utilizes the emerging computational grounded theory methodology in combination with mixed qualitative and quantitative methods to examine the Chinese public's willingness to use AI medical technologies and its influencing factors. Revealing insights into public willingness to use AI medical treatment may promote collaboration and exchange in medical technology across different regions of China, inform policy formulation and health education, and act as a reference for health communication research and related disciplines in a Chinese and global context.

2.2 Research theory

The social environment and the corresponding behavior of others can affect people's thoughts and behaviors [1]. In this context, Social Cognitive Theory highlights individual agency and the resulting individual-environment interaction. According to the theory, behavior is shaped by an observational learning process in which people actively learn about their environment. Through observation, people reflect on and evaluate various features of their environment, establish goals, and map potential behaviors [2]. The core view of Social Cognitive Theory posits that human cognition extends beyond internal psychological processes and is instead a dynamic process embedded in a social and cultural background.

2.2.1 The individual dimension of social cognition

Observational learning. Individuals learn by observing the actions of others and their consequences. Observational learning is not limited to direct demonstration of actions but also includes media-mediated indirect experiences. In the context of AI medical services, the public may shape their perceptions and attitudes through observing others' experiences with AI medical care.

Self-efficacy. The belief that an individual can successfully complete a certain behavior is called self-efficacy. In the context of medical AI, the level of self-efficacy will affect the public's acceptance and willingness to use such technologies, with individuals with high self-efficacy being more likely to adopt AI technologies.

Social norms and expectations. In a social environment, individuals are affected by social norms and other people's expectations, and often adjust their cognition and behavior in response. The public's views on and behavior towards AI medical technology will also be affected by factors such as public opinion, expert opinions, and recommendations from relatives and friends.

2.2.2 The group dimension of social cognition

Public cognition on AI medical technology and services under social interaction. Information on medical AI obtained through various media channels will influence people's cognition and attitudes toward such technologies. The public's awareness of AI medical applications may be formed through various means, such as observation and learning, information access, and social interaction.

Self-efficacy drives the public's willingness to use AI medical technologies and services. Self-efficacy is an important driving factor for public acceptance and use of AI medical technology and services. Factors such as confidence in AI medical technology and services and individuals' belief in their own health management abilities will affect their willingness to use such applications.

Social norms domesticate the public's use of AI medical technology and services. Social groups of varying ages, genders, and education levels will perceive AI medical technologies and services

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differently, with their views further shaped by social norms, peer influence, and social media.

Cultural background affects the public's social cognition of AI medical technology and services. Social cognitive theory emphasizes the influence of cultural background on individuals' cognition and behavior. This study analyzes the variations in public perceptions of AI medical technology and services across different cultural backgrounds and regions, offering theoretical insights for cross-regional medical cooperation efforts.

2.3 Research methods

The hybrid approach, which combines qualitative and quantitative methods, originated in applied social science research. Under the pragmatic paradigm, the hybrid approach emphasizes the results of actions and the solution of practical problems over methodological disputes. Combining qualitative and quantitative methods results in a more comprehensive understanding of social science research questions [3], and computational grounded theory provides a logical framework that leverages these methods. As defined by Lazer et al., 2012, computational social science is devoted to the development and application of computational methods to social science. For complex large-scale human (or simulated human) behavioral data [4], the hybrid research method of computational grounded theory is effective and applicable to the dynamic interactions underlying public perception of AI medical technologies.

As an emerging methodology that is driven by data and leverages experience, computational grounded theory aims to transcend the limitations of the traditional binary opposition of quantity and quality, and organically integrate different methods [5]. We conducted a mixed study on the public's willingness to use AI healthcare and the factors influencing their perceptions through a seven-step analytical process: data acquisition and processing; three-level coding of conceptualization; theoretical saturation testing; theoretical model construction; Latent Dirichlet Allocation thematic cluster analysis; emotional network graph analysis, and model fitting optimization evaluation. The goal is to explore the merits of AI medical technology and services, and foster further research in health communication. Computational grounded theory maintains the flexibility and depth of grounded theory in terms of theory generation, while also improving research efficiency and scalability, making it possible to process and interpret large-scale datasets.

2.4 AI healthcare

AI medical treatment is an emerging topic in the field of health communication. Modern health communication research originated with the promotion of the Stanford Heart Disease Prevention Program, the three Community Chronic Disease Intervention Project, and the five City Community Cardiovascular Disease Intervention Project in the United States [6]. The academic journal Health Communication, founded in 1989, is considered a landmark for the study of health communication in the United States. The issues of public health, disease prevention, rehabilitation, and patient-doctor relationships have become important topics in health communication. In 1994, Rogers explained in the book "The Virgin Land of Health Communication" that, "Health communication differs from traditional communication research in the following two aspects: first, in terms of research variables, all dependent variables of health communication are aimed at extending life span, so the withdrawal of bad habits and change of life habits are its main research content. Second, it requires collaboration from the World Health Organization, public health, communication, and other disciplines [7]." Moreover, Rogers' theory of innovation diffusion promoted the study of public health and health communication. A career change further shifted his focus from sociology to the field of communication. At the same time, with medical insurance reform occurring and financial support increasing in the United States, the American academic community and the public began to take a more cross-disciplinary approach to health communication. They started focusing on grassroots campaigns, system construction, and the improvement of public health, entering a new period of growth.

Rogers' Health Communication Theory, developed in the United States, has had a profound influence on Chinese health communication research. Scholars have suggested that health communication research should focus on a deeper understanding of the relationships between factors [8], and pay attention to theoretical communication methods involving attention and information processing modes [9]. The development of health communication in China similarly needs to adhere to interdisciplinary research concepts. Some studies have found that Chinese farmers' views on disease and medical treatment have both traditional and modern characteristics, and change with social development [10]. Other studies revealed that the establishment of harmonious doctor-patient relationships in rural society is based on

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equal and effective communication, the effectiveness of which is influenced by familial networks in communities, and is rooted in the adherence of doctors to benevolent professional ethics [11]. These interdisciplinary studies have provided a theoretical foundation for the development of health communication in China. Health communication in China needs to focus on Chinese health issues, but also engage with international academia, and use multidisciplinary approaches to promote innovation and discourse [12].

This study focuses on emerging issues of medical AI in Chinese health communication and explores the public perception of AI medical treatment. This is accomplished by analyzing the cognitive psychology and interaction behavior of the public towards AI medical technology. Health services are powerful predictors of hospitalization rates and mortality [13], and their relationship with mental health has also been confirmed [14]. From a health communication perspective, AI medicine can mitigate morbidity, hospitalization, mortality, and mental health issues. This results from the rapid development of AI technology, which has made significant inroads into the medical field, not only changing the medical industry but also affecting the public's daily lives and their health decisions. AI medicine leverages advancements in information technology and medical science, and this new health service model enables medical data to overcome geographical barriers, driving rapid and sustainable development while alleviating medical resource shortages [15]. However, the public's acceptance of and willingness to use AI medical treatments varies. Due to the differences in medical systems, cultural backgrounds, and social environments across regions, the public's acceptance of and willingness to use AI medical treatments may be substantially different. Using computational grounded theory from the perspective of social cognitive theory, we investigate the characteristics and differences in public willingness to use AI in medical treatment to provide a practical reference for health communication research and medical cooperation in China and abroad.

3. Research design

3.1 Qualitative text analysis

Qualitative text analysis is the primary method used in this study to understand the public's willingness to use AI in medical treatment and its influencing factors. Interview samples were first collected through a questionnaire. The text was obtained using the semi-structured interview method, and then the research text was extracted using Stanford CoreNLP processing and cleaning. Finally, Nvivo software was used to systematically encode the research text and construct a theoretical model. In the process of qualitative text analysis, we also apply thematic and discourse analysis to explore the influence of public cognition, attitude, behavior, motivation, values, and social and cultural background on AI healthcare. This is done while ensuring the comprehensiveness and representativeness of the information collection, following ethical principles, and ensuring the privacy of the subjects. Through qualitative text analysis, the study aims to reveal the public's complex attitudes toward AI medical technologies and services, providing theoretical insights for subsequent policy formulation and the sustainable development of AI medical technologies.

3.2 Quantitative content analysis

Quantitative content analysis is employed to describe and interpret the public's willingness to use AI in medical care and its influencing factors. In this study, THULAC, a Chinese word segmentation tool developed by the Natural Language Processing and Social and Humanistic Computing Laboratory of Tsinghua University, was used for primary word segmentation of the research text. Secondly, the Gensim library in Python was applied for LDA topic modeling and cluster analysis of the research samples and word segmentation results. Then, the NLP emotion annotation tool Brat was used to evaluate the emotional content of the research samples and the clustering results, and Gephi was applied to visualize the emotional network from the annual emotion evaluation results. The credibility and feasibility of the study sample were ensured, and ethical policies were followed to protect the privacy of the subjects. Through quantitative content analysis, we aim to reveal the public's demand and emotional preference for AI medical technology and services, and provide quantitative support for its promotion and application.

3.3 Mixed method analysis

Mixed-method evaluation of the public will and its influencing factors helps validate the rationale of

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our research methodology. Based on a combination of qualitative text analysis and quantitative content analysis, model fitting will be assessed according to the theoretical model, topic clustering, and emotion map. The Mixed Methods Evaluation Tool (MMAT) is commonly used for the assessment of mixed-method studies and can evaluate the methodological quality of five types of studies, such as qualitative studies, randomized controlled trials, non-randomized studies, quantitative description studies, and mixed-method research studies. For each included study, after answering two screening questions, the appropriate category was selected for evaluation and then scored according to the criteria of the selected category [16]. In this study, the Mixed Methods Appraisal Tool (MMAT) is used to conduct basic evaluation of the model, but in-depth index evaluation is not performed, as it falls outside the scope of this study.

4. Research and analysis

4.1 Data acquisition and processing

In order to obtain the cognitive psychology and interactive attitudes of the Chinese public regarding AI medical treatment, we designed a sampling questionnaire and interview outline based on topics related to AI medical technology and services. The sampling of research objects combined the principles of purposive sampling and simple random sampling. The first-level sampling criteria involved screening whether the subjects were familiar with and had used AI medical technology or services. Then, for the second-level sampling criteria, subjects who met the first-level criteria were randomly selected nationwide as the final research samples. Based on this, we first distributed 69 interview questionnaires randomly across the country and selected 30 subjects after manual screening and elimination. Secondly, because one subject was temporarily ill and declined, 29 subjects were confirmed after communication, and basic information of the subjects was obtained, as shown in Table 1. A total of 107,321 characters of text data were obtained via semi-structured one-to-one interviews, remote video, recordings, offline meetings, and continuous interaction. Based on the principle of objective truth, we use Stanford CoreNLP for tokenization of the original text data and elimination of irrelevant content, yielding a study text of 86,355 characters.

Table 1: Basic information regarding the "AI Medical" interview subjects.

Serial number	Interviewee ID	Gender	Age	Educational Background	Occupation	Location	Annual Income (RMB)
1	G1	Female	31	Bachelor's Degree	Private Enterprise Employee	Municipal districts of Shanghai	200,000 - 400,000
2	G2	Female	29	Bachelor's Degree	Institutional Employee	Ganzhou City, Jiangxi Province	200,000 - 400,000
3	G3	Female	27	Bachelor's Degree	Private Enterprise Employee	Municipal districts of Shanghai	50,000 - 100,000
4	G4	Female	37	Secondary School Diploma	Private Enterprise Employee	Dongguan City, Guangdong Province	10,000 - 50,000
5	B1	Male	25	Bachelor's Degree	Private Enterprise Employee	Xingtai City, Hebei Province	50,000 - 100,000
6	G5	Female	20	Bachelor's Degree	Undergraduate Student	Urumqi, Xinjiang Uygur Autonomous Region	10,000 - 50,000
7	G6	Female	23	Bachelor's Degree	Undergraduate Student	Changsha, Hunan Province	Less than 10,000
8	G7	Female	28	Master's Student	Private Enterprise Employee	Hangzhou City, Zhejiang Province	100,000 - 200,000
9	B2	Male	27	Bachelor's Degree	Private Enterprise Employee	Municipal districts of Shanghai	100,000 - 200,000
10	G8	Female	21	Master's Student	Undergraduate Student	Tangshan City, Hebei Province	Less than 10,000
11	G9	Female	38	Bachelor's Degree	State-Owned Enterprise Employee	Chengdu, Sichuan Province	100,000 - 200,000
12	G10	Female	41	Bachelor's Degree	Private Enterprise Employee	Municipal districts of Chongqing	200,000 - 400,000
13	G11	Female	43	Master's Student	Foreign-funded Enterprise	Shenzhen, Guangdong Province	200,000 - 400,000

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14	G12	Female	34	Bachelor's Degree	Private Enterprise Employee	Municipal districts of Shanghai	100,000 - 200,000
15	G13	Female	35	Bachelor's Degree	Institutional Employee	Municipal districts of Tianjin	100,000 - 200,000
16	G14	Female	37	Associate's Degree	Private Enterprise Employee	Zhengzhou City, Henan Province	100,000 - 200,000
17	G15	Female	27	Bachelor's Degree	State-Owned Enterprise Employee	Quanzhou City, Fujian Province	50,000 - 100,000
18	G16	Female	23	Bachelor's Degree	Undergraduate Student	Shenzhen, Guangdong Province	Less than 10,000
19	B3	Male	30	Eminent Scholar	State-Owned Enterprise Employee	Ningbo City, Zhejiang Province	200,000 - 400,000
20	B4	Male	26	Bachelor's Degree	State-Owned Enterprise Employee	Municipal districts of Beijing	200,000 - 400,000
21	G17	Female	26	Bachelor's Degree	Private Enterprise Employee	Municipal districts of Chongqing	100,000 - 200,000
22	G18	Female	19	Bachelor's Degree	Undergraduate Student	Shaoyang City, Hunan Province	10,000 - 50,000
23	G19	Female	38	Bachelor's Degree	State-Owned Enterprise Employee	Xi'an City, Shaanxi Province	100,000 - 200,000
24	B5	Male	37	Bachelor's Degree	State-Owned Enterprise Employee	Shenzhen, Guangdong Province	50,000 - 100,000
25	G20	Female	23	Bachelor's Degree	State-Owned Enterprise Employee	Shenyang City, Liaoning Province	50,000 - 100,000
26	G21	Female	21	Bachelor's Degree	Undergraduate Student	Qingdao, Shandong Province	10,000 - 50,000
27	G22	Female	22	Bachelor's Degree	Undergraduate Student	Baoding City, Hebei Province	Less than 10,000
28	G23	Female	27	Bachelor's Degree	Private Enterprise Employee	Municipal districts of Tianjin	10,000 - 50,000
29	G24	Female	24	Master's Student	Undergraduate Student	Fuzhou, Fujian Province	Less than 10,000

4.2 Conceptual coding

4.2.1 Open coding

In order to achieve preliminary conceptualization and categorization of the data, we use open coding to segment the study text and assign corresponding concepts to it. We conceptualize the original sentences suitable for third-level interview coding to create an open coding table for 'AI medical treatment' (Table 2), comprising 23 concepts derived from the interview text coding.

Table 2: "AI Medical" open coding table.

Serial number	Concept	Text
1	Perceived usefulness	G18: The process involves registering online, where you can access useful intelligent services.
2	Perceived ease of use	G19: The second is the convenience and ease of use of the service, and patients can get a good experience during the use of the service.
3	Technical awareness	G10: AI medical services are widely used today. They are typically employed to screen for early symptoms and assist doctors in conducting specialized examinations later.
4	Technical differentiation	G7: AI medical services have the advantage of being more accurate than traditional medical technology services. They can effectively meet differentiated clinical needs, especially in some underdeveloped places.
5	Technology trust	G17: I wanted it to have a human touch, and I wanted it to be less robotic. Only in this way can people have more closeness and trust it more.
6	Functional requirement	B2: I hope we can add some more convenient functions for the elderly in the future. Because older people may not understand the digital operation of AI medical services.
7	Service demand	G2: I hope AI medical services will be introduced to every household in the future, providing more convenience for the public at home.

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8	Content requirement	G4: I find AI medical services more convenient because they provide answers based on my input.
9	Technical positioning	G5: I think the positioning of AI medical services should be to assist, answer, and serve.
10	Technical publicity	B4: Promote AI medical services through various social media platforms, such as video-sharing platforms, social media moments, and Xiaohongshu (Red Book).
11	Technical assistance	B3: I think the reason for the use of AI medical services in the future may be that it saves manpower and material resources, and can greatly help doctors in diagnosis.
12	Technical discomfort	G20: Sometimes a lot of irrelevant information pops up on its pages. It interferes with my ability to receive information or my mood at the time.
13	Service discomfort	G22: The downside is that even though it can come up with particularly accurate treatments, it can't provide the emotional care that a human doctor can.
14	Content discomfort	G21: But AI medical machines may be relatively immature for practical operations such as pulse feeling, this is some of my views.
15	Data security	G6: When I ask questions to AI medical machines, big data may label me with a specific disease, leading to harassing calls and targeted ads.
16	Privacy security	B1: There are usually some cases of personal privacy leakage in hospitals, and medical data is relatively sensitive. If personal information and diagnosis are used by criminals, it may cause tragedy.
17	Ethical security	G9: I think the ethical question of AI medical services is whether it is controlled by humans or by medical machines.
18	Service expectation	G1: The most important improvement needed in AI medical technology and services is to consider the user's feelings.
19	Innovation expectation	G8: It can give more accurate, more practical, and more appropriate diagnoses for different conditions, which is a reflection of its development in a more efficient direction.
20	Promotion expectation	G12: Break information silos, provide richer and more comprehensive data support for AI medical systems, and ensure data security and privacy protection so that the public, doctors, patients, and institutions can use it confidently.
21	Character influence	G14: My family members have used AI medical services, and they recommended me to use online AI medical services because there are more people to see a doctor offline.
22	Technological ecology	G23: I can join the professional community via the inquiry network's medical website, engage in AI medical associations or practitioner communities on Zhihu, and follow prominent AI medical experts.
23	Social image	G15: AI medical treatment refers to intelligent medical services or personalized solutions developed using generative AI technology, such as AI-driven online consultations, health monitoring bracelets, and other devices.

4.2.2 Spindle coding

To identify correlations between concept categories, we employ spindle coding to uncover, establish, and clarify the general relationships among various concepts. Through repeated coding iterations, eight categories (second-level coding) were identified. Table 3 shows the “AI Medical” spindle coding.

Table 3: "AI Medical" spindle coding.

Serial number	Category	Concept
1	Perceptual impression	Perceived usefulness, perceived ease of use
2	Technological cognition	Technology awareness, technology differentiation, technology trust
3	Demand factor	Functional requirements, service requirements, content requirements
4	Technical practice	Technical positioning, technical publicity, technical assistance
5	Risk prevention	Technical discomfort, service discomfort, content discomfort
6	Safety specification	Data security, privacy security, ethical security
7	Technical expectation	Service expectation, innovation expectation, promotion expectation
8	Social environment	Character influence, technology ecology, social image

4.2.3 Selective coding

To establish clear relationships between the issues, we focus on "the public's willingness to use AI for medical treatment and its influencing factors." Selective coding is used to summarize the core categories from the existing conceptual categories and categorize them along the analysis axis. The five

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key factors—public cognition, public practice, public evaluation, public feedback, and social environment—represent the core categories influencing the public's willingness to use AI in medical treatment (level 1 coding). Table 4 presents the selective coding relationships.

Table 4: This caption has one line so it is centered.

Factor	Category	Concept
(1) Public perception	① Perception impression	1 Perceived usefulness
		2 Perceived ease of use
	② Technical cognition	3 Technical awareness
		4 Technical differentiation
		5 Technology trust
	③ Demand factors	6 Functional requirements
		7 Service requirements
		8 Content requirements
(2) Public practice	④ Technical practice	9 Technical positioning
		10 Technical publicity
		11 Technical assistance
(3) Public evaluation	⑤ Risk prevention	12 Technical discomfort
		13 Service discomfort
		14 Content discomfort
	⑥ Safety specifications	15 Data security
		16 Privacy and security
		17 Ethical safety
(4) Public feedback	⑦ Technical expectations	18 Service expectation
		19 Innovation expectation
		20 Promotion expectation
(5) Social environment	⑧ Social environment	21 People influence
		22 Technology ecology
		23 Social image

4.3 Theoretical saturation test

The purpose of a theoretical saturation test is to assess the relevance and sufficiency of the concepts and categories derived from the research. After encoding the selected interview texts, six interview texts were chosen for the theoretical saturation test (in addition to the 23 previously conceptualized interview texts), and these texts were re-encoded. The results showed that the existing concept categories were relatively complete, and no new concepts and categories were found except for the five core categories (public cognition, public practice, public evaluation, public feedback, and social environmental factors) that affected the public's willingness to use AI in medical care. Therefore, it is likely that the "public's willingness to use AI in medical treatment and its influencing factors," as obtained by computational grounded theory, has reached a state of theoretical saturation.

4.4 Theoretical model construction

In this study, five core categories (public cognition, public practice, public evaluation, public feedback, and social environmental factors). Eight sub-categories were also considered, including perceived impression, technology cognition, demand factors, technology practice, risk prevention, safety norms, technology expectation, and social environment. Additionally, 23 concepts were explored, such as perceived usefulness, perceived ease of use, technology awareness, technology differentiation, technology trust, functional needs, service needs, content needs, technology positioning, technology publicity, technology assistance, technology discomfort, service discomfort, content discomfort, data security, privacy security, ethical security, service expectations, innovation expectations, promotion expectations, character influence, technological ecology, and social image concept. Through the three stages of open coding, spindle coding, and selective coding, a theoretical model diagram illustrating the

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public's willingness to use AI medical technology and its influencing factors was developed, as illustrated in Fig. 1. This diagram illustrates that public cognition influences public practice in the theoretical model of public intention to use AI medical treatment. Moreover, demand factors impact both public assessment and public feedback. Public assessment subsequently influences both public practice and feedback. The social environment plays a significant role in shaping public cognition, public practice, public evaluation, and public feedback. Furthermore, public practice is influenced by both public cognition and public evaluation.

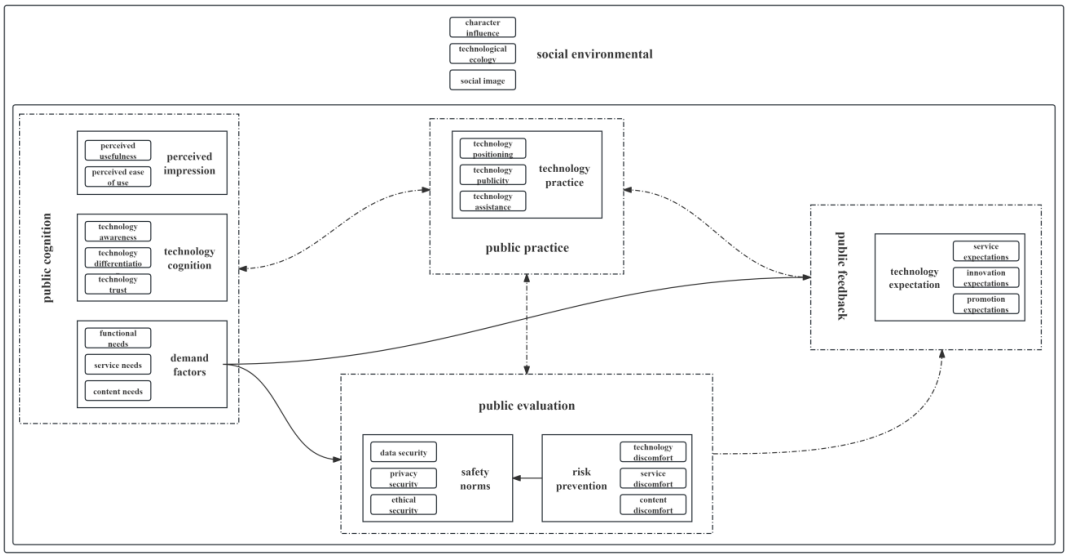

Figure 1: Theoretical model of public willingness to use AI medicine and its influencing factors.

4.5 LDA topic cluster analysis

Following the construction of the theoretical model of the public's willingness to use AI medical treatment and its influencing factors, we employed computer-aided content analysis to explore the thematic connections and emotional relationships between various concepts and categories. Subject connections and emotional relationships play a crucial role in exploring the two-way interactions and cognitive feedback between the public and the concept of AI medical treatment. In this study, the Chinese word segmentation extractor THULAC, developed by the Natural Language Processing and Social and Humanistic Computing Laboratory of Tsinghua University, was employed to divide the study text into 1,682 phrases. Subsequently, 264 phrases were obtained through data processing, which involved the removal of modal words, deletion of degree words, and refining of phrase contents. Then, the Gensim library in Python was employed for LDA topic modeling and cluster analysis on the research samples and word segmentation results. LDA thematic clustering enables us to analyze the public's willingness to use AI medical technologies and its influencing factors according to five core categories: public cognition, public practice, public evaluation, public feedback, and social environmental factors. Fig. 2 illustrates the thematic clustering diagram of the public's willingness and its influencing factors. The average degree of the network diagram has values of 46.565, and the average clustering coefficient is 0.981. In this thematic clustering graph, the top positions the thematic clustering node group of social environment, the left positions the node group of public cognition, the middle positions the node group of public practice, the bottom positions the node group of public evaluation, and the right positions the node group of public feedback. The topic clustering node group of public feedback has a greater influence, followed by the node group of public practice. This indicates that the public's willingness to use AI medical care is primarily centered on practice and feedback information. Therefore, AI medical technology and services should likely prioritize improving patients' user experience and feedback channels in the future.

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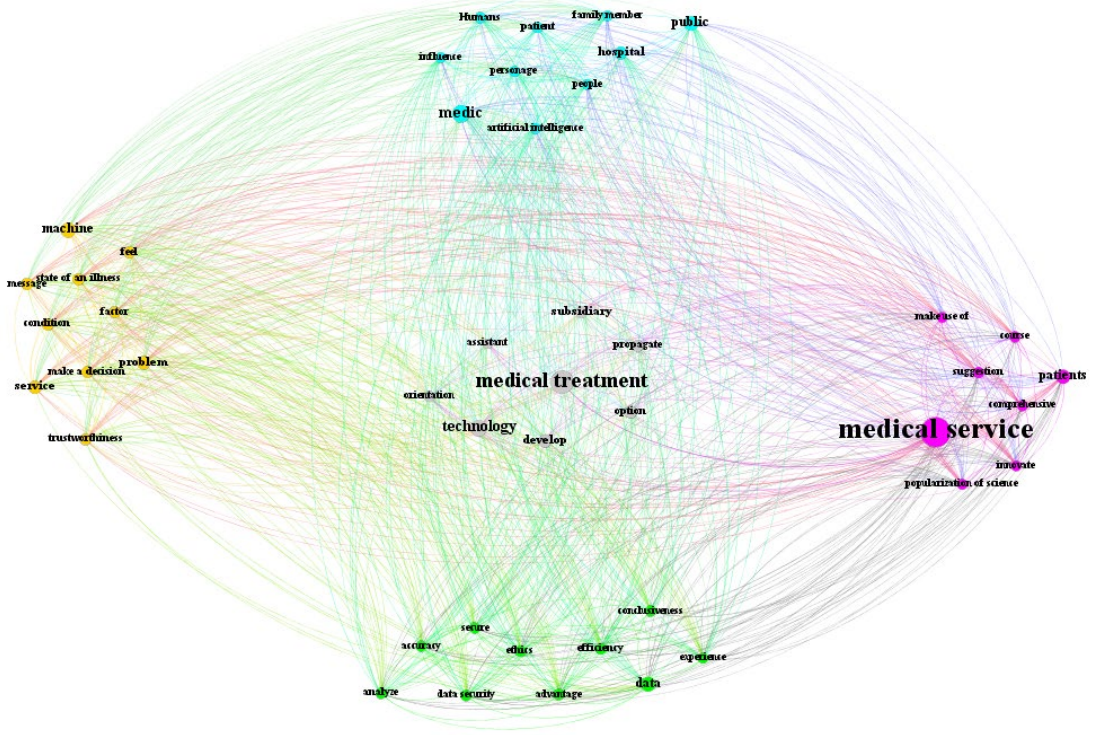

Figure 2: Thematic clustering diagram of public willingness to use AI medical treatment and its influencing factors.

4.6 Emotional network map analysis

To predict the public's emotions towards AI medical treatment, we employed Brat, an NLP emotion annotation tool, to conduct emotional assessments on the research samples and clustering results. Subsequently, we employed Gephi to visualize the emotional network map of the annual emotion assessment results. In this study, a total of 1,773 phrases of emotion segmentation were obtained based on the theoretical model of public intention to use AI medical treatment and influencing factors, and the emotion map was designed according to positive, negative, and neutral emotional attributes, as shown in Fig. 3. The average degree of the network diagram has values of 31, and the average clustering coefficient is 0.979. In the emotional graph, the top positions the public's neutral emotions towards AI medical technology and services, the lower left positions negative emotions, and the lower right positions positive emotions. The upper neutral affective node group has a greater influence, and the lower left negative affective node group has the least influence. This shows that the public maintains a relatively objective attitude towards AI medical technology and services. Moreover, the influence of the green positive emotion node group is more significant than that of the red negative emotion node group. Thus, it is likely that the public's usage of AI medical services will increase in the future.

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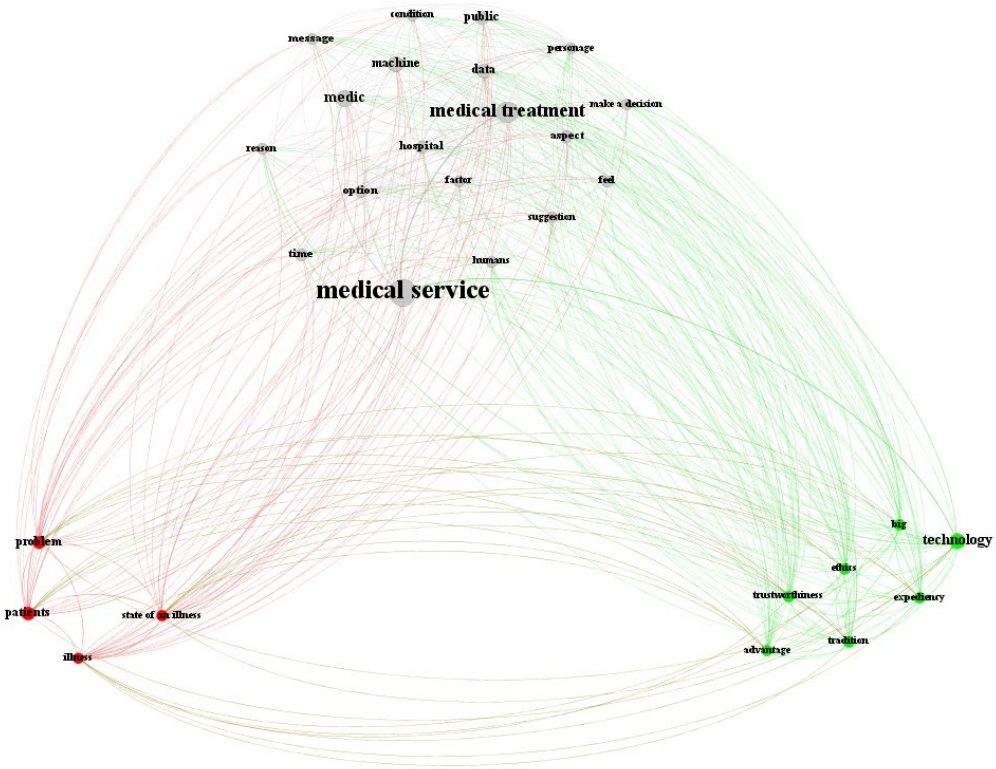

Figure 3: The public's willingness to use AI medical treatment and the affective map of influencing factors.

4.7 Model fitting optimization analysis

After combining the results of the qualitative text analysis and quantitative content analysis, the Mixed Methods Evaluation Tool (MMAT) was employed to evaluate five core categories (public cognition, public practice, public evaluation, public feedback, and social environmental factors) and eight sub-categories (perception impression, technology cognition, demand factors, technology practice, risk prevention, safety norms, technology expectation, and social context) in the theoretical model's contextual categories. Additionally, 23 concepts (perceived usefulness, perceived ease of use, technology awareness, technology differentiation, technology trust, functional needs, service needs, content needs, technology positioning, technology publicity, technology assistance, technology discomfort, service discomfort, content discomfort, data security, privacy security, ethical security, service expectation, innovation expectation, promotion period perception, character influence, technical ecology, and social image concept) were screened for responses and category assessment. Overall, the data from the 29 subjects yielded a high score (92.3 points) for three types of analysis: the theoretical model, the theme clustering graph, and the emotion graph of AI medical technology public use intention and influencing factors. This demonstrates the effectiveness of the present study in analyzing the public's willingness to use AI medical treatments and its influencing factors, using the mixed method of computational grounded theory.

5. Discussion

With rapid advancements in generative AI technology, the continuous development of AI medical technology has witnessed the emergence of new use case scenarios and influencing factors. Digital technology enables personalized customization of health information according to the user's preferences, medical history, and other parameters. However, people should be wary of the potential pitfalls when accepting personalized content recommended by algorithmic technology [17]. Digital services provide convenience, but there is still a need to improve privacy protection and mitigate the vulnerabilities associated with stereotypical responses. In the context of health communication in China, the research topic of AI medical technology also needs to be explored in congruence with factors such as public health systems, doctor-patient communication relationships, and regional ecological differences. From the

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perspective of social cognitive theory, this study uses computational grounded theory to explore the public's willingness to use AI medical treatment and the factors influencing this willingness. This study enriches the academic content of health communication, and provides a new path for interdisciplinary work. As a mixed-methods paradigm in informatics social science, the advantages of computational grounded theory in processing large-scale complex datasets have been well established. This study explores the relationship between the public and AI healthcare in the context of increasing technological adaptation. In effect, it is a dynamic tracking experiment of human-computer interactions based on cognitive and behavioral frameworks, investigating the varying opinions of the public on AI medical treatment.

6. Conclusions

6.1 Cognitive differences: The public's persistent impressions of AI healthcare

The study found that there are significant differences in the public's perception of AI healthcare. Some members of the public hold a positive attitude towards AI medical technology, believing that it can significantly improve the efficiency and accuracy of medical services. This is especially relevant for remote and auxiliary diagnosis, as exemplified by Subject B3, who said, "It can save manpower and material resources, and greatly assist doctors in diagnosis." However, some members of the public still have reservations regarding AI medical treatment, fearing that it lacks humanized care and may carry the risk of misdiagnosis. For example, Subject G1 said, "AI medical technology has no human temperature, so it should be promoted to improve its humanization and make it closer to people's feelings." The formation of such persistent impressions is influenced not only by personal experience but also by media reports or discussions in social circles, reflecting the importance of observational learning in social cognitive theory.

6.2 Emotional mapping: The public's multiple understandings of AI healthcare

Our study found that the public's emotional mapping to AI medical treatment is complex and diverse, comprising positive, negative, and neutral attitudes. The positive emotions mainly come from the recognition of the efficient and convenient characteristics of AI medical technology, as well as the expectation of its improvement in the quality and accessibility of medical services. For example, Subject G17 said, "When it gives some targeted and accurate treatment plans, I agree with it very much." Negative feelings mainly focus on data security, privacy protection, and ethical concerns, as well as worries that the widespread application of AI medical technology may bring unforeseen risks. For example, Subject G23 said, "When handling patient information, it is necessary to ensure the security of data, and users' privacy cannot be disclosed, otherwise it will cause serious damage to users." Neutral people hold a “wait-and-see” attitude, and look forward to verification on more practical applications, such as when Subject G12 said, "If AI medical technology is strictly verified, and there are a number of successful cases as support, then I will tend to believe in its accuracy and reliability." These multiple understandings reflect the public's complex feelings about AI medical technology and services, providing an important reference for future development.

6.3 Process evaluation: The public's intuitive experience of AI healthcare

We found that the public's intuitive experience with AI healthcare is mixed in terms of process evaluation. Some members of the public generally appreciate the convenient registration, online consultation, and other services provided by AI medical platforms, believing these functions effectively save time and energy. For example, Subject G15 said, "I mainly like the convenient functions, which will be slightly cheaper than my own offline registration." Other members of the public encountered problems such as complex operations and redundant information, leading to poor user experience. For instance, Subject B5 said, "I think the professionalism of AI medical services is not perfect, and doctors need to manually diagnose some complex conditions." In addition, the public showed varying degrees of concern and expectations about the diagnostic accuracy of AI medical treatment and the reliability of subsequent treatment recommendations. This experiential feedback is of great significance for optimizing AI medical service processes and improving user experience.

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6.4 Feedback concerns: The public's continued expectations for AI healthcare

It was discovered through feedback concerns that the public has sustained expectations for the future development of AI healthcare. They generally hope that AI medical technology will ensure accuracy, but also pay greater attention to humanistic care and provide more personalized and humanized services. For example, Subject G4 said, "I think AI medical services should be positioned at the goal of popularization and human service." There are also some concerns about the popularity and accessibility of AI medical technology, expecting it to cover more remote areas, and alleviate the problem of uneven distribution of medical resources. For example, Subject G5 said, "I think the public's trust in AI medical services should start from the most grassroots services." In the interviews, concerns about data security, privacy protection, and ethical norms were mentioned, prompting the public to call on relevant departments to strengthen supervision and guidance of AI medical technology and services. For example, Subject G3 said, "The government and relevant departments should also formulate strict laws, regulations, and policy standards to regulate the use of AI medical technology." These public expectations may provide inspiration for future research directions, and formulation of policy and regulations regarding AI medical technologies and services.

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