International Journal of Education and Humanities
ISSN: 2770-6702 | Vol. 22, No. 1, 2026

AI-Driven Medical Companion Service for Elderly: A Smart Matching Model

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Abstract: This study proposes an AI-powered medical companion service system entitled "Heart Bridge Guardian," aiming to address the prominent healthcare challenges encountered by elderly individuals living alone or lacking adequate family support. Integrating artificial intelligence technologies, standardized healthcare protocols, and volunteer service networks, the system delivers one-on-one medical escort services encompassing medical appointment scheduling, in-hospital navigation, and post-treatment followup management. A three-dimensional innovative framework is constructed, which integrates theoretical modeling, technological R&D, and empirical validation. For user interaction, the system adopts a WeChat mini program as the core access terminal; technically, it implements a dynamic matching algorithm based on Location-Based Service and leverages block chain technology to ensure data integrity. Furthermore, a tripartite collaborative mechanism is established involving community hospitals, nursing institutions, and volunteer teams. Pilot trials were conducted in two communities, covering 50 service cases. The results indicate that the system reduces the olderly's healthcare-related time costs by 40% and significantly enhances service transparency. This research not only enriches the theoretical and practical landscape of smart elderly care models but also provides valuable implications for the integration of AI into public health service systems.

Keywords: AI Matching, Elderly Healthcare, Medical Companion Service, Smart Healthcare, Service Design, Aging Population.

1. Introduction

With the rapid aging of the global population, the healthcare needs of elderly individuals, especially those living alone or with limited family support, have become increasingly urgent. In China, the "Health China 2030" initiative emphasizes the importance of equitable and accessible healthcare services for all age groups. However, elderly individuals often face difficulties in navigating complex medical systems, leading to delayed treatments and increased familial burdens. Existing medical companion services are often fragmented, lacking standardization, technological integration, and sustainable operational models. This study introduces "Heart Bridge Guardian," an AI-enhanced medical companion service system that aims to bridge this gap by providing personalized, transparent, and efficient healthcare support. The project combines service design theory, smart matching algorithms, and multi-stakeholder collaboration to create a replicable and scalable model for elderly medical care.

2. Theoretical Framework and Service Model

2.1. Theoretical Foundation and Core Problem

Against the backdrop of an accelerating aging population in China-with 264 million people aged 60 and above, accounting for 18.7% of the total population according to the Seventh National Population Census-the healthcare challenges faced by the elderly, particularly the "emptynest elderly," have become increasingly prominent. Traditional medical companion services suffer from three structural contradictions: fragmented service provision, inefficient matching mechanisms, and subjective quality assessment. These issues result in significant difficulties for the elderly in navigating registration, consultation, and understanding medical information, severely impacting the effective utilization of healthcare resources and the overall patient experience for this demographic[3].

This project adopts a systems theory and service design theory approach to construct a three-dimensional, integrated service model of "AI + Healthcare + Philanthropy." This model transcends traditional unidimensional service paradigms by organically combining technological innovation, medical expertise, and social support. Theoretically, it draws upon Donabedian's structure-process-outcome framework for healthcare quality evaluation and Parasuraman's service quality gap model to establish a tailored service quality assessment system that aligns with the Chinese context and the specific characteristics of the elderly population.

2.2. Service Model Construction

2.2.1. Detailed Explanation of the Three-Dimensional Driving Model

AI Intelligence Dimension: Employs machine learning-based personalized matching algorithms that analyze multiple factors such as health status, medical history, language preference, and mobility of the elderly to achieve precise matching with service personnel. The algorithm utilizes an enhanced collaborative filtering technique, integrated with real-time geo-location information, to dynamically adjust matching strategies.

Medical Professionalism Dimension: Develops standardized medical service process packages covering 12 critical nodes across the "pre-consultation, during consultation, and post-consultation" continuum. Each node features clear operational protocols and contingency plans to ensure the professionalism and safety of medical companionship. Collaborations with tertiary hospitals in

Huzhou facilitate the establishment of a medical knowledge base and guidelines for managing common conditions.

Philanthropic and Social Dimension: Establishes a three-tier service team comprising “volunteers + professional caregivers + social workers.” Volunteers primarily provide emotional companionship and basic assistance, professional caregivers handle medically related tasks, and social workers coordinate resources to address social support needs.

2.2.2. Service Quality Evaluation System

A quantified evaluation system was developed, consisting of 5 first-level indicators and 18 second-level indicators:

Table 1. Service Quality Evaluation System

First-Level Indicator	Second-Level Indicators	Weight	Measurement Method
Service Responsiveness	Response time to appointment, Matching accuracy rate, On-time arrival rate	25%	System auto-log & User evaluation
Medical Professionalism	Application of medical knowledge, Emergency response capability, Accuracy in executing medical instructions	30%	Expert review & Process documentation
Humanistic Care	Communication effectiveness, Emotional support, Respect for privacy	20%	User satisfaction survey & Eye-tracking analysis
System Stability	Platform availability, Data security, Technical failure rate	15%	System log analysis & Stress testing
Cost-Effectiveness	Time-saving rate, Fee reasonableness, Resource utilization rate	10%	Cost-benefit analysis

This evaluation system was finalized through a three-round Delphi Method involving 15 experts from fields including healthcare management, geriatric nursing, and information technology. In practical application, block-chain technology ensures the authenticity and immutability of evaluation data.

2.3. Innovative Theoretical Contributions

This project’s theoretical innovations are primarily manifested in three aspects:

Firstly, it proposes the “Context-Adaptive Matching Theory.” Unlike traditional algorithms relying on static tags, our model incorporates dynamic contextual factors, including the elderly’s real-time physical condition, environmental changes, and emotional state. Physiological data from wearables and environmental sensor data enable the system to adjust matching strategies in real-time.

Secondly, it constructs a “Trust-Enhancement Mechanism Model.” To address the trust barriers elderly individuals may have towards new technologies and unfamiliar service providers, a progressive trust-building mechanism was designed. This involves establishing initial trust through personal referrals and low-risk tasks, enhancing trust through transparent service processes and real-time feedback, and solidifying trust through emotional connection and long-term service provision[4].

Finally, it develops a “Cross-Institutional Collaborative Governance Framework.” A tripartite collaborative working mechanism was established among community hospitals, elderly care institutions, and volunteer organizations, clarifying the boundaries of rights and responsibilities, rules for information sharing, and mechanisms for benefit distribution among the parties. This framework serves not only medical companionship but also provides a reference for other cross-sectoral social services.

3. Technological Implementation and System Development

3.1. System Architecture Design

3.1.1. Overall Technical Architecture

This project adopts a microservices architecture, divided into four functional layers for modularity and scalability. The Presentation Layer is a cross-platform WeChat Mini Program with three terminals: Family Member Terminal (service appointment, progress tracking, payment, evaluation), Service Provider Terminal (task reception, navigation, recording, emergency assistance), and Administrator Terminal (service monitoring, personnel dispatch, data analysis, quality assessment).

The Application Layer includes core business modules: Intelligent Matching Engine (dual-profile matching for users and service providers), Real-time Dispatch System (dynamic task allocation and route optimization), and Quality Monitoring Platform (real-time service tracking with automatic anomaly alerts).

The Service Layer provides foundational technical capabilities: LBS Location Service (Gaode Map API for positioning and route planning), Block-chain Service (Hyperledger Fabric-based data certification), and AI Algorithm Service (machine learning model deployment and inference).

The Data Layer uses a hybrid database architecture: MySQL for structured business data, InfluxDB for IoT device data, and Neo4j for user relationships and service networks.

3.1.2. Security and Privacy Protection

This project’s data security architecture covers four key dimensions: the Transport Layer adopts end-to-end HTTPS encryption based on the TLS 1.3 protocol; the Storage Layer encrypts sensitive data (e.g., medical records) using the national cryptographic standard SM4 algorithm; Access Control combines Role-Based Access Control (RBAC) and Attribute-Based Encryption (ABE); Privacy Computing leverages federated learning for necessary data analysis, ensuring raw data remains local.

To address the elderly’s unique privacy needs, a “Privacy Preference Setting” function is designed, enabling users to adjust information sharing scope by comfort level: Basic Mode (shares only essential medical visit information), Balanced Mode (shares medical history and medication information), and Comprehensive Mode (grants access to health records and real-time monitoring data). All privacy settings feature visual interfaces with voice guidance and human assistance options, ensuring accessibility for elderly users.

3.2. Tripartite Collaboration Mechanism Implementation

A dedicated tripartite collaboration platform is developed to enable information sharing and business coordination. For data sharing, unified data standards and exchange protocols are established, with an API gateway implemented for interface management and traffic control, while data anonymization and differential privacy techniques safeguard sensitive information. The business process coordination follows four phases: first, community hospitals report lists of elderly individuals in need of companion services via the system (Demand Identification Phase); second, the system automatically matches caregivers from elderly care institutions and volunteers from organizations (Resource Matching Phase); third, the three parties conduct real-time communication on service progress through the platform (Service Execution Phase); and fourth, they jointly participate in service quality assessment and improvement (Effect Evaluation Phase).

In terms of communication and coordination mechanisms, regular joint meetings (monthly coordination sessions to address common issues), a 24/7 emergency response channel, and a knowledge sharing platform (for case studies and best practice dissemination) are established.

4. Pilot Study and Data Analysis

4.1. Pilot Design and Implementation

4.1.1. Pilot Site Selection Criteria

Two representative communities in Huzhou City were selected for the pilot:

Pilot A: Urban Old Community

Demographics: 38% elderly population, high proportion of emptynesters.

Medical Resources: Distant from tertiary hospitals, basic community hospital facilities.

Digital Literacy: Approximately 45% smartphone usage among the elderly.

Pilot B: New Mixed Community

Demographics: Mixed population of elderly and young, frequent intergenerational interaction.

Medical Resources: Proximity to newly built general hospitals.

Digital Literacy: Approximately 65% smartphone usage among the elderly.

4.1.2. Participant Recruitment

Participants were recruited through multiple channels including neighborhood committees, senior activity centers, and family doctor referrals. Inclusion criteria:

1) Age ≥ 65 years.

2) Regular healthcare needs (≥ 1 visit per month).

3) Children not residing locally or unable to provide companionship.

4) Mentally lucid and able to cooperate with the study.

5) Voluntary participation with signed informed consent.

Ultimately, 50 eligible elderly individuals were recruited—30 from Pilot A and 20 from Pilot B. A control group of 50 elderly individuals with similar characteristics not using the service was established concurrently.

4.1.3. Service Implementation Process

Each participant received services for a 3-month period, with an average of 8.2 service instances per person, and all services strictly adhered to standardized procedures. In the Pre-Consultation Phase (24 hours before the service), the system automatically sends reminders to both service providers and users; service providers review the user's basic information and specific medical visit needs, while verifying essential items such as medical records, health insurance cards, and regular medications. During the Consultation Phase (on the day of the visit), the service provider arrives at the user's home 30 minutes in advance and assists with the entire process including registration, waiting, examinations, and medication collection, with eye-tracking devices used to record the user's focal points and areas of confusion during the visit. In the Post-Consultation Follow-up Phase (within 72 hours after the visit), the service provider offers medication guidance and recovery advice, schedules follow-up appointments or the next service, and collects service evaluation and quality feedback from the user[6].

4.2. Data Collection and Methodology

4.2.1. Multidimensional Data Collection

A five-dimensional data collection system was constructed to comprehensively capture relevant information throughout the service process. For quantitative data, it includes service process data (response time, service duration, route distance), medical efficiency data (waiting time, consultation time, rate of repeated tests), and cost-effectiveness data (transportation costs, time costs, medical expenses). Qualitative data encompasses in-depth interview transcripts (pre- and post-service interviews with users, family members, and service providers), observational notes (researchers' participatory observation records), and service logs (detailed service records compiled by providers). Physiological data is collected via smart wristbands, covering indicators such as heart rate, step count, and sleep quality, with a focus on monitoring changes in physiological indicators on the day of the user's medical visit. Behavioral data includes eye-tracking data (visual attention distribution during visits recorded using Tobii Pro Glasses 3) and mobile phone usage data (mini-program usage frequency and feature preferences). Environmental data involves the collection of hospital crowding levels, traffic conditions, and weather conditions.

4.2.2. Analytical Methods

This study adopted a mixed-methods research approach integrating quantitative and qualitative analyses to comprehensively examine the effectiveness of the service system. For quantitative analysis, SPSS 26.0 was used for descriptive statistics; difference testing was conducted via independent samples t-test and Mann-Whitney U test; correlation analysis included Pearson correlation and Spearman rank correlation; regression analysis encompassed multiple linear regression and logistic regression; and path analysis was performed using Structural Equation Modeling with AMOS 24.0. Qualitative analysis employed thematic analysis (Braun & Clarke, 2006), narrative analysis, and grounded theory with selective coding. For eye-tracking data analysis, Areas of Interest (AOI) were divided by segmenting the hospital environment into registration area, waiting area, consultation room, examination area, and other functional zones; core metrics including fixation count, fixation duration, time to first fixation, and scanpath were calculated, supplemented by heat map and time series analysis to interpret visual attention patterns.

4.3. Research Results and Findings

4.3.1. Quantitative Analysis of Service Effectiveness

Medical visit efficiency achieved significant improvement: the average visit time was reduced from 4.2 hours (traditional model) to 2.5 hours, a 40.5% decrease; waiting time dropped by 52%, mainly driven by optimized appointment scheduling and precise timing arrangements; the rate of repeated tests declined by 28%, which is attributed to service providers providing complete medical history for healthcare professionals[5].

Service Quality Indicator Performance:

Table 2. Service Quality Indicator Performance

Indicator	Experimental Group	Control Group	Improvement
Appointment Response Time	15.3 min	42.7 min	64.2%
Matching Accuracy Rate	92.5%	/	/
User Satisfaction Score	4.7/5.0	3.2/5.0	46.9%
Service Completion Rate	98.2%	/	/
Complaint Rate	0.8%	3.5%	77.1% decrease

A cost-benefit analysis was conducted to evaluate the system's value: the direct cost is an average service fee of ¥85 per session, with 50% subsidized by the government and 50% co-paid by users; indirect benefits include saving users' time valued at approximately ¥120 per session and reducing families' income loss due to work absence by around ¥150 per session; social benefits are reflected in reduced occupancy of public healthcare resources and improved hospital turnover efficiency.

4.3.2. In-depth Findings from Eye-Tracking

Analysis of eye-tracking data uncovered valuable behavioral patterns among elderly users: regarding information access barriers, the average fixation time of elderly individuals on hospital signage was 12.7 seconds-three times longer than that of younger adults-they faced significant difficulty understanding information on electronic screens (often showing repeated viewing and confused expressions), and during complex form-filling, their fixation points were scattered without systematic patterns; in terms of emotional state recognition, under anxiety, their visual field narrowed with repeated fixations on the same area, during prolonged waiting, "visual wandering" occurred with difficulty maintaining focus, and when interacting with service providers, their fixation points concentrated on the provider's face to seek emotional support. Based on these findings, the service processes were optimized: adding a pre-guidance phase to explain the hospital layout and procedures in advance, adopting larger fonts and simpler visual cues, and providing appropriate attention-guiding activities during waiting periods.

4.3.3. Qualitative Analysis of User Satisfaction

Coding analysis of interview transcripts identified five core themes:

Theme 1: Restoration of Dignity

"Before, I was always anxious going to the doctor alone. Now with Xiao Wang accompanying me, I feel much more at ease. When the doctor asks questions, someone is there to help me explain clearly."(Aunt Zhang, 72 years old)

Theme 2: Humanized Technology

"I was initially worried about not being able to use the phone, but it turned out to be very simple-just one tap. My children living far away can also see my appointment progress, which puts their minds at ease."(Uncle Li, 76 years old)

Theme 3: Rebuilding Relationships

"Xiao Chen not only accompanies me to the doctor but also calls regularly to check on me, just like having an extra granddaughter."(Grandma Wang, 79 years old)

Theme 4: Enhanced Autonomy

"I can choose who accompanies me. I prefer Xiao Liu because she is patient and understands my condition well." (Grandpa Zhao, 75 years old)

Theme 5: Reduced Family Burden

"Working in Shanghai, my biggest worry was my parents' medical visits. With this service, I can have weekly video calls with the companion to get updates, which has greatly reduced my stress.""(User's child, 45 years old)

4.3.4. Service Provider Perspectives

Service providers' feedback was equally valuable: regarding professional growth, they noted that through systematic training and practice, their knowledge of elderly care had become more structured; in terms of work support, they commented that the backend system was intelligent, providing reminders for route planning and precautions; and on value recognition, they expressed that seeing the genuine gratitude from the elderly made this work feel particularly meaningful.

4.4. Influencing Factors and Moderating Effects

Regression analysis identified several significant influencing factors: service matching accuracy (β=0.42, $p<0.001$), communication effectiveness (β=0.38, $p<0.01$), and technology ease of use (β=0.31, $p<0.05$) emerged as significant positive predictors; additionally, several moderating and mediating effects were discovered—digital literacy positively moderates the relationship between technology acceptance and satisfaction, social support mediates the relationship between service quality and mental health, and age exhibits an inverted U-shaped relationship with service demand and effectiveness, with the 75-80 age group deriving the greatest benefits[7].

5. Operational Model and Social Impact

5.1. Construction of a Sustainable Operational Model

5.1.1. Multi-Source Funding Mechanism

This project has designed a "tripartite co-construction" funding support system, forming a stable and sustainable funding structure. Government subsidies account for 40%, among which basic service subsidies are included in the government procurement service catalog and distributed at a fixed monthly per capita standard; meanwhile, efforts are made to secure special fund support for innovation projects from departments such as the Health Commission and Civil Affairs Bureau, and explore the inclusion of certain preventive companion services in medical insurance reimbursement to expand policy support channels. Social donations account for 30%, including obtaining social responsibility donations through cooperation with local enterprises, applying for grants from public welfare foundations focusing on elderly health, and launching a WeChat public donation channel to receive small-sum donations from the public, thus pooling forces from all sectors of society. User payments account for 30%, adopting a differentiated charging mechanism: three tiers (full exemption, half-price, and full-price) are set based on income levels to meet the needs of users with different economic conditions; membership services such as monthly, quarterly, and annual cards are launched with preferential discounts to enhance user stickiness; appropriate value-added service fees are charged for personalized customized services to balance public welfare attributes and operational sustainability.

5.1.2. Personnel Management and Incentive Mechanisms

The project has established a classified and hierarchical service personnel management system, formulating differentiated standards and safeguard measures for different types of personnel. Professional caregivers must hold nursing practice qualifications, receive dual training in medical professional knowledge and service protocols, and adopt an incentive model of "basic salary + performance bonus + career development path" to support their professional growth; social workers must possess relevant social work certificates, focus on training in communication skills and resource linkage capabilities, and implement a management method combining project-based compensation and professional supervision; volunteers need to have compassion and time availability, and can take up posts after completing basic service training and specialized skill training, with their enthusiasm stimulated through methods such as point redemption, honorary recognition, and insurance coverage. At the same time, a "Three Checks and Three Revisions" quality management system is constructed: in the pre-service review phase, qualification verification, demand matching assessment, and risk prediction are conducted; during service execution, dynamic supervision is carried out through GPS track checks, service node check-ins, and real-time feedback mechanisms; after service completion, user evaluation reviews, service record verification, and effectiveness assessment are performed to comprehensively ensure service quality.

5.1.3. Risk Management Framework

The project has systematically identified five categories of core risks and established a full-process prevention and control mechanism. In terms of medical safety risks, preventive lines are built through strict qualification review and mandatory purchase of liability insurance, and standardized emergency plans are formulated with green medical channels opened to respond to emergencies; information security risks are prevented using technical means such as data encryption, access control, and security audits, supplemented by data breach emergency response plans and legal safeguards; operational funding risks are avoided in advance through diversified funding sources and financial early warning systems, with a reserve fund system and emergency fund-raising channels established to address funding gaps; personnel management risks are reduced through strict background checks, systematic training, and psychological support, and a reserve talent pool and rapid replacement mechanism are built to ensure service continuity; legal compliance risks are prevented in advance through standardized contract formulation and legal consultant consultations, with legal aid and insurance claims services provided to address disputes. Meanwhile, a comprehensive insurance protection system is constructed: the maximum compensation limit for liability insurance per person per service reaches 500,000 yuan, personal accident insurance is purchased for both service providers and users, and property loss insurance that may occur during the service process is covered to comprehensively reduce risks for all parties.

5.2. Social Impact and Value Creation

5.2.1. Individual-Level Impact

The project has brought multi-dimensional well-being improvements to the elderly: their dignity in medical consultations has been significantly enhanced, realizing a transformation from "passively receiving services" to "proactively choosing services"; their health status has continued to improve, with the timely medical consultation rate increasing to raise the chronic disease control rate by 25%; their psychological state has been continuously optimized, and according to the UCLA Loneliness Scale, the loneliness score of the elderly has dropped from 6.8 to 4.2; the digital divide has been effectively bridged, and the elderly's smartphone usage skills have been generally improved, enabling them to better adapt to digital life. For families, the caregiving pressure has been greatly reduced, with the anxiety level of family members decreasing by 38%; the economic burden has been significantly alleviated, with the average monthly income loss due to work absence reduced by approximately 1,200 yuan; intergenerational relationships have been continuously improved, as family members are freed from cumbersome caregiving tasks and have more time for emotional communication, enhancing family harmony.

5.2.2. Community-Level Impact

Community cohesion has been continuously strengthened: the volunteer team has expanded from 15 initial members to 85, forming a distinctive "elderly-helping-elderly" mutual assistance model, the utilization rate of community elderly service facilities has increased by 40%, and the atmosphere of neighborhood mutual assistance has become increasingly strong. Community resources have been optimally integrated: the allocation of medical resources has become more reasonable, the outpatient volume of community hospitals has been evenly distributed, effectively alleviating the diagnosis and treatment pressure of tertiary hospitals; human resources have been efficiently utilized, with idle human resources such as retired medical staff and students fully activated and invested in elderly services; the functional scope of spatial resources has been expanded, and community activity centers have been transformed into comprehensive service hubs to maximize service efficiency.

5.3. Analysis of Model Replicability

5.3.1. Critical Success Factors

Five critical success factors have been summarized from the pilot practice: first, government support and policy innovation-the project has been included in the government’s key people’s livelihood work, a cross-departmental coordination mechanism has been established, and seed funds and policy pilot space have been obtained, providing a solid guarantee for the project’s implementation; second, appropriate technology and human-centric design-the complexity of technology matches users’ capabilities, necessary human services and traditional channels are retained, and a gradual technology introduction strategy is adopted to improve user acceptance; third, ecosystem construction and partner cooperation-a benefit-sharing mechanism has been established, the rights and responsibilities of all parties have been clarified, and cooperative relationships have been maintained through regular communication to form a synergy of multiple parties; fourth, balance between standardization and flexibility-core processes are standardized to ensure service quality, localized adjustments are made in combination with community characteristics, and a continuous improvement mechanism is established to optimize services; fifth, cultural adaptation and trust building-local cultural customs are respected, initial trust is established relying on familiar social networks, and public recognition is improved through transparent operations.

5.3.2. Replication and Promotion Roadmap

A three-phase replication and promotion plan has been formulated based on pilot experience: the first phase (1 year) is the regional deepening period, during which full-scale promotion will be carried out in Huzhou City, covering all streets and towns, service standards and operational norms will be further improved, and a municipal-level coordination platform will be established; the second phase (2-3 years) is the provincial expansion period, during which pilot projects will be launched in 3-5 selected cities in Zhejiang Province, provincial industry standards will be formulated, and regional operating agencies will be cultivated to expand the model's influence; the third phase (3-5 years) is the national promotion period, during which national-level policy recommendations will be formed, a nationwide service network will be constructed, and international cooperation paths will be explored to promote the model’s implementation on a larger scale.

5.3.3. Policy Recommendations

Phased policy recommendations have been put forward based on project practice: short-term recommendations (within 1 year) include incorporating medical companion services into the government procurement service catalog, establishing a professional qualification certification and training system for service personnel, and formulating detailed implementation rules for data security and privacy protection; medium-term recommendations (1-3 years) involve exploring the feasibility of using personal medical insurance accounts to pay for companion services, establishing a unified national service quality standard and evaluation system, and providing tax incentives for social enterprises offering companion services; long-term recommendations (3-5 years) include incorporating elderly medical companionship into the scope of basic public services, establishing a national service information platform and resource dispatch center, and promoting relevant legislative work to clarify the rights and responsibilities of all parties.

Through the systematic elaboration of the above four dimensions, this study has constructed a complete research cycle of “theory-technology-empirical evidence-application”. It not only verifies the feasibility and effectiveness of AI-driven intelligent matching in the field of elderly medical companionship but also explores a sustainable, replicable, and humanistic path for service innovation. In the context of an aging society, this model integrating technological innovation and social care provides a highly valuable solution for addressing the challenges of elderly care [2].

6. Conclusion

This study demonstrates that the “Heart Bridge Guardian -- AI-Enabled Intelligent Matching for Targeted Medical Companion Services to Special Groups” project has successfully established and validated an integrated service model that combines theoretical innovation, technological application, and sustainable operation. By integrating artificial intelligence, service design principles, and multi-stakeholder collaboration mechanisms, the project effectively addresses the core challenges faced by the elderly population, especially the empty-nest elderly, during medical visits, including difficulties with registration, consultation, and understanding medical information[1]. Systematic pilot studies confirm the model’s significant effectiveness in enhancing medical visit efficiency (average visit time reduced by 40.5%), improving service quality (user satisfaction score of 4.7/5.0), increasing service transparency, and promoting the equitable distribution of medical resources. The proposed three-dimensional “AI + Healthcare + Philanthropy” model, the “Context-Adaptive Matching” theory, and the blockchain-based data certification mechanism not only provide a practical pathway for addressing elderly medical companionship issues but also contribute to the theoretical development in the fields of smart healthcare and public health services[2]. Furthermore, the explored diversified funding model of “government subsidies + social donations + low-cost user fees” and the “Three Checks and Three Revisions” quality management system lay a solid foundation for the service’s sustainability and replicability. The resulting “Huzhou Model” exhibits strong potential for broader replication, offering an innovative solution characterized by technological advancement, social inclusiveness, and economic feasibility to address China’s increasingly severe aging challenge and contribute to the “Healthy China 2030” strategic goal[4].

Acknowledgments

The successful completion of this research and the “Heart Bridge Guardian” project is indebted to the generous support and selfless assistance from various parties. First and foremost, we sincerely thank Huzhou College for the research grant, which provided crucial financial and resource support for the smooth implementation of the project. We are deeply grateful to our supervising instructor, Associate Professor Zhao Bing, for her dedicated guidance and invaluable advice throughout the entire process, including project conception, research design, methodological instruction, and paper writing. We extend our heartfelt thanks to the Huzhou Elderly Service Center, the cooperating community hospitals, and relevant elderly care institutions for providing venue support, personnel coordination, and valuable data resources during the pilot phase, enabling the empirical study to proceed smoothly. Our gratitude goes to the project team members, Huang Shuting, Liu Zheng, and Sun Mengfei, for their hard work and close collaboration. Their professional contributions in medical process design, AI algorithm development, system testing, and data analysis were pivotal to the project’s success. Furthermore, we thank all the elderly users and their family members who participated in this study for their trust and cooperation. Their feedback is the core driving force for the continuous improvement of the project. Finally, we express our appreciation to all the experts, scholars, peer reviewers, and journal editors who have shown

interest in and supported this research.

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