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AI Virtual Caregiver for Indigenous Cultural Health Stations

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ABSTRACT : *This study develops an AI Virtual Caregiver system that integrates cultural care and health care functions for Indigenous Cultural Health Stations (CHSs) in Taiwan. In response to challenges of an aging population, caregiver shortages, and digital divides, the research proposes an AI Cultural Health Station (AI-CHS) model combining generative AI, wearable devices, and cloud-based management. Using a triangulation method—interviews, questionnaires, and field observations at the Zhudong CHS—the study examined elders' technology acceptance, caregivers' workload, and cultural participation. Results show high elder acceptance of smart devices, strong cultural identity, and heavy caregiver workload. The AI Virtual Caregiver effectively supports physiological monitoring, emotional interaction, and cultural learning, embodying "Cultural Empathy × Emotional Care × Intelligent Assistance." The findings demonstrate that AI-CHS can enhance care precision, reduce manpower stress, and promote cultural sustainability, providing a practical model for Taiwan's Long-Term Care 3.0 transformation.*

KEYWORDS - *AI Virtual Caregiver, Cultural Health Station, Indigenous Elder Care, Cultural Empathy, Smart Long-Term Care*

I. INTRODUCTION

1. Research Motivation

Taiwan is rapidly entering a super-aged society. According to the Ministry of Health and Welfare (2023), by 2025 one out of every five people will be aged 65 or above, and the elderly population will exceed 20%. This proportion is projected to reach 46.5% by 2070 [1]. Facing the dual challenges of increasing long-term care (LTC) demands and workforce shortages, the government revised the "White Paper on an Aged Society" in 2021, proposing four major visions-"autonomy, independence, inclusion, and sustainability." In 2023, it launched the "Action Plan for Coping with a Super-Aged Society (2023–2026)", emphasizing five key initiatives, including "Digital Competence and Lifelong Learning" and "Health Promotion and Care Enhancement," to build an inclusive and sustainable elderly society.

Among various LTC facilities, Indigenous Cultural Health Stations (hereafter referred to as "CHSs") play a vital role as community-based care centers. The number of CHSs increased from 121 in 2016 to 519 in 2024, serving approximately 16,340 elders [2]. The year 2025 marks not only the first year of Taiwan's super-aged society but also the beginning of the LTC 3.0 blueprint. In the earlier LTC 2.0 plan, Chapter 6 specifically addressed Indigenous peoples, ensuring their LTC rights and establishing a target of 530 CHSs nationwide to support aging in place. While CHSs currently provide physical fitness and health-promotion programs, they have also expanded services under LTC 2.0 to include community daycare, simplified home-based care, and innovative programs. However, caregivers and CHS directors have reported that while these expanded services strengthen

the local LTC network, they also significantly increase caregiver workloads. Moreover, they question whether the professional skills and digital literacy of caregivers can keep up with the growing and diversified needs of Indigenous communities. Therefore, they urge the government to ensure adequate manpower, resources, and training when expanding LTC 3.0 services so that the system can function smoothly [3].

In 2024, President Lai Ching-Te launched the "Healthy Taiwan Policy", emphasizing "enhancing Indigenous health services" and focusing LTC 3.0 on integrating smart technology and digital transformation [4]. However, the application of smart technologies remains largely limited to hospitals and day-care centers, leaving CHSs underdeveloped in digitalization and smart service integration.

Research has shown that smart technologies can effectively reduce caregivers' burdens, improve documentation, and enhance service efficiency [5]. Automated health monitoring and cloud-based data integration can further improve care precision and response time [6]. Therefore, this study proposes the first "AI Cultural Health Station (AI-CHS)" model, integrating generative AI, virtual caregivers, smartwatches, the CareSpot health transfer station, and a cloud-based health management system to establish a smart Indigenous CHS combining both *cultural care* and *health care* functions. In this model, smartwatches continuously monitor elders' heart rates, blood oxygen levels, and sleep quality, while CareSpot collects physiological data via Bluetooth. The data are analyzed by an AI virtual caregiver, which provides real-time feedback and emotional interaction, forming a 24-hour intelligent companionship system that extends the traditional CHS model.

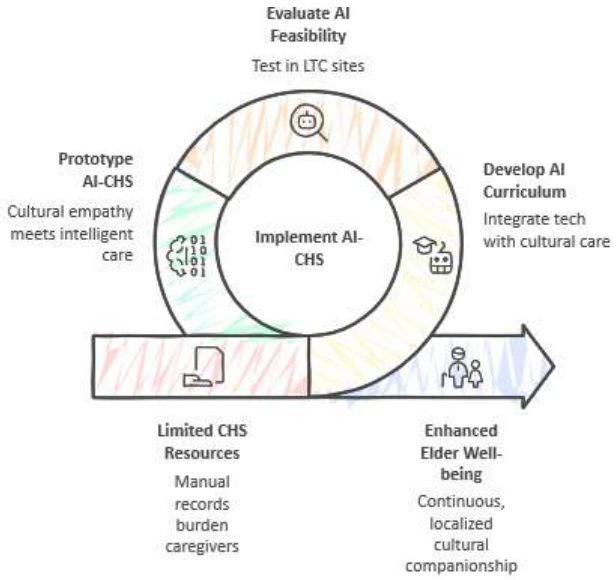

Fig. 1 AI-powered cultural and health care for elders

Fig. 1 illustrates the contextual background and needs for establishing the AI Cultural Health Station (AI-CHS). Nevertheless, existing CHSs continue to face challenges such as manpower shortages, heavy documentation workloads, and digital divides [7]. Caregivers must simultaneously look after multiple elders and handle complex recordkeeping, compromising service quality; some elders also struggle with using digital devices and thus cannot benefit from technological support. This figure illustrates the contextual background and motivation for developing the AI Cultural Health Station (AI-CHS). It shows how artificial intelligence, wearable technologies, and cultural interaction modules work together to support Indigenous elders' daily lives. The system provides continuous physiological monitoring, emotional companionship, and culturally meaningful activities—addressing caregiver shortages while promoting both physical well-being and cultural continuity within community-based elder care.

To address these issues, this study sets out three motivations. First, it aims to develop an AI-based CHS curriculum model that integrates smart technology with the philosophy of cultural care. Through technological

assistance, it seeks to reduce caregiver workload while promoting elder health and psychosocial well-being through cultural interaction. A field investigation was conducted in November 2024 at the Zhudong Metropolitan Indigenous Cultural Health Station. The study found that although the CHS actively promotes intergenerational learning and cultural transmission, it suffers from limited funding and insufficient digital equipment. Most health records remain manually maintained, imposing a heavy burden on caregivers and highlighting the urgent need for smart transformation. Hence, the first motivation of this study is to assist this CHS in transforming into a demonstration site for AI-CHS and to verify the practical effectiveness of AI virtual caregivers in real-world LTC settings.

Second, this study aims to evaluate the feasibility of implementing AI-CHS in practice. The proposed "AI-driven Care Life Chain" integrates health monitoring and AI-assisted companionship and has already undergone proof-of-concept (PoC) testing in LTC sites and community pharmacies. Preliminary findings support that smart technology can improve care efficiency and enhance emotional support for elders.

Third, in response to the needs of a super-aged society and Indigenous LTC contexts, this study integrates smart technology with cultural care principles to develop a prototype AI-CHS characterized by "cultural empathy × intelligent care." The model seeks to overcome time and manpower constraints in CHS services by providing continuous, localized cultural and health companionship. The research outcomes are expected to serve as valuable references for promoting AI-enabled smart transformation within the LTC 3.0 framework shown as Fig. 2.

Fig. 2 AI cultural health station (CHS) system architecture diagram

Fig. 2 illustrates the overall system architecture of the AI Cultural Health Station (AI-CHS). It integrates cultural care and health care functions through three main components: (1) the elder side, including wearable devices and interactive tablets for physiological monitoring and AI companionship; (2) the caregiver side, which provides automated data recording, emotional tracking, and cultural interaction support; and (3) the management side, which consolidates cloud-based dashboards for health and cultural analytics. Together, these modules form an intelligent, culturally responsive care ecosystem that enhances service precision, reduces workload, and promotes Indigenous cultural sustainability.

2. Research Objectives

Based on the three research motivations described above, this study establishes five main research objectives, as follows.

To explore the feasibility and practical needs of integrating AI technologies into Cultural Health Stations (CHSs). This objective aims to analyze elders' technology acceptance, caregivers' workload, and their interaction dynamics to assess the feasibility and actual needs of introducing AI into CHS services. The findings will provide a foundation for the design and application strategies of smart care systems.

To analyze the current state of elders' health care and propose directions for developing AI-based health management functions. This objective investigates elders' health-related conditions, including sleep quality, daily activity levels, medication adherence, attendance rates, and mobile device usage. Cross-analysis will identify at-

risk groups and existing care issues, forming the basis for improvement strategies and the design of AI virtual caregivers' health management functions.

To assess the current situation of cultural care and identify design requirements for AI cultural interaction.

This objective examines elders' cultural identity, Indigenous language use, and participation in cultural activities to evaluate the effectiveness of CHSs in cultural preservation and community-based care. The results will inform the integration of cultural care and Indigenous language interaction into the design of AI virtual caregivers.

To investigate elders' emotional and social connection status and develop AI-based emotional support functions. This objective explores elders' emotional well-being and social connectedness, analyzes emotional challenges and social interaction barriers, and proposes improvement strategies to guide the emotional support and social interaction modules of AI virtual caregivers.

To collect stakeholder requirements for developing an AI virtual caregiver framework. This objective involves conducting in-depth interviews with CHS stakeholders—including participating elders, caregivers, and CHS directors—to identify their functional needs and expectations for AI virtual caregivers. The results will serve as critical references for system development, user interface design, and implementation strategies.

II. LITERATURE REVIEW

This literature review is organized based on the research objectives and the conceptual framework proposed for the development of the AI Cultural Health Station (AI-CHS). It aims to synthesize relevant theories, empirical studies, and practical evidence that inform the integration of cultural care, health management, and emotional support through artificial intelligence. The structure of the review follows five main analytical perspectives corresponding to the study's objectives: (1) the feasibility and needs of AI adoption in Cultural Health Stations; (2) the current status of health care and the definition of AI-assisted health management functions; (3) cultural care practices and the design implications for culturally adaptive AI systems; (4) emotional and social connection mechanisms for AI-based support; and (5) the synthesis of stakeholder needs leading to the formation of the AI Virtual Caregiver framework. Through this structure, the review connects theoretical foundations—including Transcultural Nursing Theory, Smart Long-Term Care, and Indigenous-led AI Health Models—with practical applications, establishing a knowledge base for implementing an AI-driven, culturally sensitive long-term care ecosystem.

1. Super-aging society and digital transformation in long-term care

Taiwan is rapidly entering a super-aging society, accompanied by increasing demand for long-term care (LTC) and a shortage of caregivers. Since 2023, the government has implemented LTC 3.0 and the healthy Taiwan policy**,** which emphasize inter-ministerial collaboration and the integration of smart technologies (AI, IoT, wearables) to improve care quality and relieve human labor burdens [8] [9]. While day-care centers have gradually adopted such technologies, **indigenous** Cultural Health Stations (CHS) still face both geographic and digital disparities, revealing an urgent need for the integration of local cultural care and intelligent healthcare**.**

2. Transcultural nursing theory and local practices

Leininger's transcultural nursing theory (2005) highlights cultural empathy, respect, and individualized care as essential for person-centered service [10]. In Taiwan, CHS serve as community-based hubs that combine Indigenous language interaction, cultural participation, and social bonding—embodying the essence of transcultural care [11]. However, limited resources, high caregiver workloads, and digital divides constrain their potential. These challenges have prompted a shift toward exploring AI-enhanced culturally safe care mechanisms [12].

3. Smart technology and the AI virtual caregiver in LTC

Wearable sensing, IoT, and cloud data systems enable continuous monitoring of physiological indicators—such as heart rate, SpO_2, and sleep quality—and generate automated alerts and reports. Integrated with generative

AI, such systems can provide natural-language health feedback, reminders, and personalized suggestions. Studies have shown that effective integration of smart devices and AI systems can reduce caregivers' routine workload and enhance care precision**,** forming a sustainable model for technology-assisted LTC.

4. Indigenous-led AI health models and data governance

Recent research stresses Indigenous-led digital health**,** emphasizing community co-design**,** data sovereignty, and cultural governance principles [13]. Evidence suggests that participatory design and community data governance increase user trust, adoption, and self-management efficacy [14]. These findings underpin the present study's design of the AI Cultural Health Station (AI-CHS)**,** ensuring that technology implementation aligns with local values and cultural rights [12].

5. Affective computing and ethics: emotional and social support modules

As AI systems become increasingly involved in caregiving, emotional and ethical considerations are critical. Khalil et al. (2025) introduced the concept of "agentic AI," focusing on moral adaptability and empathy in elder interactions [15]. Likewise, Rony et al. (2025) found that transparency and dignity preservation significantly affect elder trust in AI-assisted care [16]. In Indigenous contexts, these values intersect with cultural continuity, language revitalization, and intergenerational learning [17]. Culturally adaptive AI care can therefore enhance both emotional well-being and social cohesion.

6. Integration of AI in CHS contexts: system flow and stakeholders

The conceptual flow of "Elder Side → AI Virtual Caregiver → Caregiver Side → Management Side" represents how real-time physiological and cultural interaction data are collected, processed, and analyzed by AI models, and subsequently visualized in caregiver dashboards and managerial reports. This stakeholder-based structure integrates the Health Care**,** Cultural Care, and Emotional/Social Support modules, forming a community-based intelligent Cultural Health Station (AI-CHS)**.**

7. Alignment with research objectives

Objective 1: Assessing feasibility and needs for AI integration
Literature reveals significant caregiver burden and digital inequality within CHS, yet also indicates rising technology acceptance among elders. Hence, this study evaluates acceptance, interaction motivation, and caregiver work patterns as empirical foundations for AI deployment strategies.

Objective 2: Analyzing health-care conditions and defining AI functions
Using smartwatch and CareSpot data—sleep, activity, medication regularity, and attendance—this research identifies risk patterns and service gaps to design personalized reminders, abnormal alerts, and cloud health record systems**.**

Objective 3: Evaluating cultural care practices and deriving AI design needs
Studies link cultural identity, Indigenous-language interaction, and cultural participation with elder well-being. AI should therefore embed language interfaces, storytelling/music modules, activity guidance**,** and participation tracking to reinforce cultural continuity and intergenerational learning.

Objective 4: Exploring emotional and social connections for AI support functions
Affective computing combined with conversational and social prompts enhances emotional well-being and interaction quality**.** Ethical and privacy considerations—including explainable feedback and human oversight—must accompany system design.

Objective 5: Synthesizing stakeholder needs to form the AI virtual caregiver framework

Through interviews with elders, caregivers, and CHS administrators, this study integrates functional requirements, interface preferences, operational protocols, and governance principles, yielding a structured AI-CHS architecture comprising three modules, a data-service flow, and a community governance mechanism.

8. Research gap and contribution

Most prior studies have addressed single dimensions—either health monitoring or cultural activities—without fully integrating cultural, health, and emotional support within CHS settings. Few have incorporated Indigenous data governance or co-design mechanisms. This research proposes an AI-CHS model that unites the three modules with governance and service-flow mechanisms, empirically testing five objectives to deliver a locally grounded, culturally sensitive, and scalable paradigm for smart long-term care.

9. Linking theory and practice: conceptual framework synthesis

Based on the literature review, a conceptual framework of the study is proposed shown as Fig. 3 below. It is a three-tier framework connecting theory to practice by integrating Transcultural Nursing Theory, Smart LTC, and Indigenous-Led AI Health Models to promote cultural safety and technological empowerment. The framework's three modules—Health Care, Cultural Care, and Emotional and Social Support—work together through a data flow linking the Elder, AI Virtual Caregiver, Caregiver, and Management levels. This integration enhances health precision, reduces caregiver burden, strengthens cultural identity, improves emotional well-being, and advances the AI-driven LTC 3.0 transformation in Indigenous communities [18].

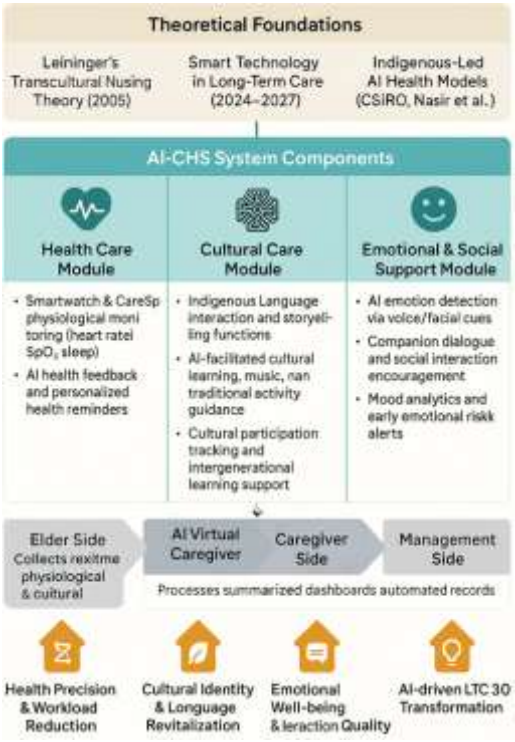

Fig. 3 Conceptual framework of the AI virtual caregiver integrating cultural and health care functions

Fig. 3. Conceptual Framework of the AI Virtual Caregiver Integrating Cultural and Health Care Functions illustrates the theoretical and practical structure supporting the development of the AI Cultural Health Station (AI-CHS). The framework is organized into three interconnected layers. The top layer represents the theoretical foundations derived from Leininger's transcultural nursing theory, smart technology in LTC, and indigenous-led AI health models, which together emphasize cultural safety and technological empowerment. The middle layer depicts the AI-CHS system components—health care, cultural care, and emotional and social support modules—that operate collaboratively to monitor physiological data, foster Indigenous language and cultural interaction, and provide emotional companionship through AI-based sensing and dialogue. The bottom layer connects data and services among the elder, AI virtual caregiver, caregiver, and management sides, translating insights into practical outcomes such as improved health precision, reduced caregiver workload, enhanced cultural identity, emotional well-being, and the advancement of AI-driven long-term care transformation. This figure

encapsulates the integration of cultural empathy and intelligent assistance within a unified AI caregiving ecosystem.

III. RESEARCH DESIGN AND IMPLICATION

This study aims to develop an AI Virtual Caregiver equipped with both cultural care and health care functions. A triangulation method was adopted, integrating in-depth interviews, questionnaire surveys, and field observations to collect diverse data from elders, caregivers, and the CHS director, thereby ensuring the validity and reliability of the research findings.

The research site was the Zhudong Metropolitan Indigenous Cultural Health Station. Participants included 16 elders (divided equally into experimental and control groups, 8 each), 3 caregivers, and 1 site director. The research design was guided by the Cultural Care Theory and integrated with smartwatches, the CareSpot Health Transfer Station, and tablet-based interactive devices to construct a comprehensive system framework for elders' health management and cultural care.

Based on this framework, the study outlined the daily service process of the AI Virtual Caregiver. The research team employed nine research instruments to collect both quantitative and qualitative data, analyzing elders' technology acceptance, health conditions, and cultural needs. Through triangulated analysis across three stakeholder groups (elders, caregivers, and management), the study identified key functional design directions for the AI Virtual Caregiver.

The outcome was the construction of an innovative AI Cultural Health Station (AI-CHS) model characterized by "Cultural Empathy × Emotional Care × Intelligent Assistance." The research design and process are elaborated in 7 sections as follows.

1. Conceptual framework

The conceptual design framework for the development of the AI Virtual Caregiver is illustrated in Fig. 3. As shown in Fig. 3, physiological and health data of the elders are collected through smartwatches, tablet computers, and the CareSpot health station, and then transmitted to the cloud platform. The AI Virtual Caregiver interacts with the elders in real time through a large tablet interface.

2. Research methods

This study adopted a triangulation approach, combining in-depth interviews, questionnaire surveys, and observational assessments to collect and analyze data. The design of research instruments is described as follows.

3. Research instruments

Nine instruments were developed for data collection, including an observation checklist for interactions between caregivers and elders, a health status questionnaire for elders, a Cultural Care Baseline Scale, an Emotion and Social Connection Scale, a Technology Acceptance Questionnaire for elders, a Caregiver Workload Questionnaire, and three in-depth interview guides respectively designed for elders, caregivers, and the CHS director.

4. Experimental treatment

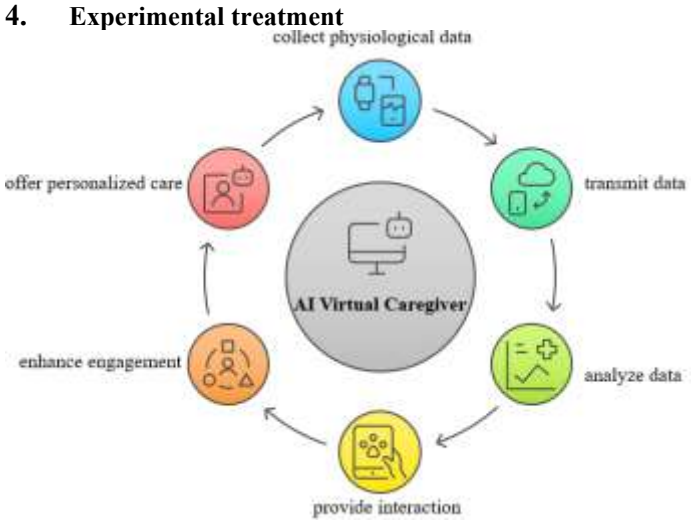

Fig. 4 The experimental treatment in terms of AI virtual caregiver

Fig. 4 illustrates that AI virtual caregiver is the experimental treatment of the study. The treatment links theoretical foundations, stakeholder needs, AI-CHS system modules, and expected outcomes to construct a culturally empathetic, technologically intelligent model for Indigenous long-term care.

5. Research Participants

The study recruited 16 elders from the Zhudong Metropolitan Cultural Health Station—eight assigned to the experimental group and eight to the control group—along with three caregivers and one CHS director.

6. Daily Service Journey of the AI Virtual Caregiver for Elders

Fig. 5 Daily service journey of the AI virtual caregiver for elders.

Fig. 5 illustrates the continuous cycle of care provided by the AI Virtual Caregiver throughout the day. Elders wear smartwatches for 24-hour health monitoring, while the AI system analyzes physiological data, offers real-time feedback, and interacts through a tablet interface. During CHS activities, the AI engages elders in Indigenous language conversations, storytelling, and cultural programs, promoting both health and cultural connection. In the evening, it provides emotional companionship and sleep monitoring. Overall, the figure highlights how AI technology integrates health care, cultural care, and emotional support to deliver personalized and culturally grounded long-term care for Indigenous elders.

7. Scenario Illustration

This project emphasizes that when elders enter the CHS, the AI Virtual Caregiver can interact with them in real time—greeting and expressing care based on their blood pressure measurements. The scenario illustration is shown as Fig. 6.

Fig. 6 AI virtual caregiver interact with the elder at the CHS

IV. RESULTS AND DISCUSSION

This pilot study aims to comprehensively examine the current conditions and needs preceding the implementation of the AI Cultural Health Station (AI-CHS). The findings are presented according to five guiding research questions.

First, based on elders' acceptance of technology, caregivers' workload, and the level of interaction between them, this study explores how AI technologies can be effectively integrated into CHS services to enhance feasibility and meet real-world needs.

Second, to address the question of how to develop an AI Virtual Caregiver with health management capabilities, the study investigates the current health care status of CHS elders. By cross-analyzing indicators such as sleep quality, daily activity, medication adherence, attendance frequency, and smartphone usage, it identifies health risks and vulnerable groups requiring additional attention. The results provide insights into problem causes, improvement strategies, and the development direction for AI Virtual Caregiver functions in health management.

Next, the study assesses the role and effectiveness of CHSs in promoting cultural transmission and culturally responsive care. This includes examining elders' cultural identity, Indigenous language interaction, and participation in cultural activities. It also investigates elders' emotional well-being and social connectedness, analyzing underlying causes and proposing strategies for improvement. Correspondingly, it defines potential functions and development pathways for the AI Virtual Caregiver in providing emotional support and facilitating social interaction.

Lastly, in-depth interviews were conducted with key CHS stakeholders—including eight elders from the experimental group, three caregivers, and one CHS manager—to identify their specific needs and expectations for the AI Virtual Caregiver. These insights will serve as a critical foundation for the subsequent design, functional development, and implementation of the AI system. Results and Discussion section is organized according to the five research objectives as follows.

1. Objective 1: Assessing feasibility and needs for AI integration

Findings indicate that caregivers at CHS experience substantial workloads, primarily due to administrative documentation and emotional management tasks. Interaction levels between caregivers and elders remain moderate, reflecting limited cultural engagement. In contrast, elders exhibit high technological readiness, with strong acceptance of smart devices and positive attitudes toward AI-assisted care. This suggests that implementing AI systems is both feasible and needed to alleviate manual tasks, strengthen interaction quality, and improve cultural engagement. Thus, AI-based CHSs should prioritize automating documentation, enhancing cultural interaction modules, and establishing mechanisms for continuous evaluation after deployment.

2. Objective 2: Analyzing health-care conditions and defining AI functions

Based on cross-analysis of eight participants' original data—including variables such as age, ethnicity, education, cohabitation status, assistive device use, sleep quality, activity level, medication adherence, attendance frequency, and smartphone usage—the results are summarized in Table 1.

Table 1 Health Status of CHS Elders

Item	**Mean**
Age (years)	72.75
Sleep quality (0–10)	7.50
Daily activity (0–10)	8.75
Medication adherence (1–5)	4.75
Attendance frequency (1–5)	5.00
Smartwatch/smartphone usage frequency (1–5)	5.00

The analysis of smartwatch and CareSpot data reveals that the average age of participants was 72, with good self-rated health, sleep quality (mean 7.5/10), and daily activity levels (8.8/10). Attendance and medication adherence were excellent, indicating consistent routines. Frequent smartphone usage (mean 5/5) reflects strong digital familiarity, forming a solid foundation for smart health management.

Correlation analysis showed that age negatively correlates with activity level ($r = -0.65$) and positively with sleep quality ($r = +0.41$), implying that physical activity decreases with age but sleep stability improves. Participants with higher education showed greater smartphone use and digital adaptability, while those living alone had poorer sleep quality, emphasizing the need for nighttime companionship. Moreover, higher attendance correlated with better medication adherence, confirming the CHS's role in reinforcing self-care behaviors.

Based on these findings, the AI Virtual Caregiver should integrate personalized sleep and medication reminders, emotional comfort during nighttime, and dashboards for caregivers to track activity trends. These functions will improve precision in health monitoring while supporting caregivers in proactive care management.

3. Objective 3: Evaluating cultural care practices and deriving AI design needs

Eight elders participated in the cultural care pretest. The average age was 72.8 years, predominantly Atayal, reflecting CHS's focus on Indigenous elders shown as Table 2. Most participants had primary or junior high education and lived with family, ensuring stable social support. About half used assistive devices, and overall health was good (average sleep quality 7/10, activity 9/10, high medication adherence).

Table 2. Cultural Care Dimensions

Dimension	**Mean**	**Description**
Cultural Identity	4.96	High sense of identity and belonging
Indigenous Language Interaction	4.46	Concern about younger generations' weak fluency
Cultural Participation	4.54	Active in events such as festivals, weaving, songs
Overall Cultural Care	4.65	Moderately high level of cultural care

The results show strong cultural identity and engagement but insufficient language transmission among younger generations. Elders demonstrated a high level of cultural identity (mean 4.96) and participation (mean 4.54), yet Indigenous language transmission was weaker (mean 4.46). Age and ethnicity also influenced cultural engagement, with Atayal elders and those aged 75–79 scoring highest. Although cultural participation remains strong, digital continuity of cultural activities is limited, and language use among younger generations is declining.

To address these challenges, the AI system should incorporate Indigenous language dialogue**,** storytelling and song modules, and digital archives for cultural education**.** The AI Virtual Caregiver can serve as a mediator for intergenerational learning by facilitating communication in local languages and offering culturally adaptive experiences. Establishing six-month evaluation cycles for cultural participation and well-being is recommended to measure long-term impact.

4. Objective 4: Exploring emotional and social connections for AI support functions

Results show that elders maintain high emotional stability (mean 4.85/5) and strong social connectedness (4.88/5). However, mobility decline and reliance on in-person CHS activities limit interaction opportunities, and subtle emotional changes often go unnoticed. AI-assisted systems can fill this gap through emotion detection**,** companion dialogue**,** and social engagement prompts**.**

The proposed emotional support system includes four integrated modules: (1) Emotion Detection and Comfort—analyzing tone and facial cues to provide empathetic responses; (2) Social Interaction Promotion—encouraging storytelling and media sharing; (3) Cultural Resonance and Language Interaction—aligning speech and tone with cultural context; and (4) Health Care Integration—combining wearable data with emotional dashboards to alert caregivers to potential risks. These features together foster continuous emotional engagement and culturally sensitive companionship.

5. Objective 5: Synthesizing stakeholder needs to form the AI virtual caregiver framework

Interviews with eight elders, three caregivers, and one CHS manager reveal consistent expectations for a system that integrates health monitoring**,** cultural care, and emotional support**.** Elders emphasize companionship and cultural preservation; caregivers seek workload reduction and automation; managers prioritize sustainability and efficiency.

Synthesizing these perspectives, the AI-CHS architecture is conceptualized as a three-tier structure:

- Elder side: Incorporates health monitoring, cultural interaction, and emotional dialogue via smart devices.
- Caregiver side: Automates records, provides emotional analysis dashboards, and supports language teaching tools.
- Management side: Integrates cloud analytics for service evaluation, policy optimization, and long-term sustainability.

Together, these tiers establish a holistic ecosystem of "Cultural Empathy × Emotional Care × Intelligent Assistance." This framework not only addresses human-resource shortages but also enhances cultural continuity and social connection, offering a new model for human-centered, culturally adaptive long-term care in Indigenous communities.

V. CONCLUSION

This study centers on the development of an AI Virtual Caregiver that integrates both cultural care and health care functions. Through in-depth interviews, questionnaire surveys, and on-site observations, it examines the feasibility and needs of introducing AI technology into Indigenous Cultural Health Stations (CHSs).

The results indicate that elders exhibit high levels of technology acceptance and strong cultural identity, caregivers experience heavy workloads and emotional stress, and CHS managers expect AI technologies to simultaneously promote cultural preservation and intelligent care. Overall, the implementation of an AI Virtual Caregiver can reduce manpower burden, enhance cultural interaction and emotional support, and improve the precision and continuity of health care—thus establishing an innovative Long-Term Care 3.0 model characterized by "Cultural Empathy × Emotional Care × Intelligent Assistance."

Based on the findings, three key recommendations are proposed:

1. Technological Development

The AI Virtual Caregiver should integrate wearable devices, physiological monitoring, and emotion recognition, while also supporting Indigenous language interaction and cultural learning functions.

2. Service Application

It is recommended to introduce automated recordkeeping and dashboard systems, and to design Indigenous language learning and cultural games to enhance elders' engagement and participation.

3. Policy Promotion

The government is encouraged to expand implementation to all 530 Indigenous CHSs nationwide, establishing an AI-based cultural and health care platform to create a new paradigm for AI-driven Long-Term Care 3.0.

In conclusion, the AI Virtual Caregiver effectively addresses the manpower shortage and digital divide in Indigenous long-term care settings, promoting the integration of cultural and health care services. Future studies may expand sample sizes, conduct multi-station comparisons, and implement longitudinal tracking to further enhance the effectiveness of AI-CHS systems—ultimately realizing the sustainable vision of "AI Virtual Caregivers Empowering Cultural and Health Care."

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