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# A Study on the Application of AI in Elderly Citizen Healthcare in Foreign Countries and its Relevance for China

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## Abstract

The rapid development of artificial intelligence (AI) has spurred the emergence of "AI + healthcare for elderly individuals," with developed nations such as the U.S., Japan, and Singapore leading in smart aging initiatives through technologies such as robotics, IoT, and big data. However, China faces significant challenges in elderly care because of its large aging population (280 million aged 60+ in 2022) and severe shortage of professional caregivers. This study examines global AI applications in elderly healthcare—including daily assistance, chronic disease monitoring, and smart home systems—while highlighting technological limitations, cybersecurity risks, and ethical concerns. The findings suggest that AI can alleviate China's elderly care crisis by adopting intelligent care robots, predictive health analytics, and assistive devices, although challenges remain in technology integration, privacy protection, and regulatory frameworks. The study concludes that while China's smart aging market holds promise, sustained progress requires technological innovation, policy support, and cross-sector collaboration to address ethical and operational barriers.

### Keywords

AI, healthcare, elderly citizens

## 1. Introduction

At present, the rapid development of artificial intelligence (AI) has sparked a new trend known as 'AI + health care for the elderly'. The foreign smart aging industry, which embarked on this journey early, has reached a more advanced stage of development. In developed nations facing aging populations, such as the United States, Britain, Australia, Japan, and Singapore, significant progress has been made in smart aging initiatives (Padhan et al., 2023). These countries leverage technologies such as big data, cloud computing, and facial recognition to introduce various intelligent aging products aimed at enhancing the quality of life of the elderly (Sullivan et al., 2024). For example, an elderly robot that made waves at the 2024 World Conference on Artificial Intelligence has demonstrated impressive capabilities. In addition to assisting with mobility, it can also interpret human expressions and respond empathetically (Tong et al., 2024). These robots undoubtedly bring vibrancy and warmth to the lives of elderly individuals.

China has a vast elderly population. According to the National Bureau of Statistics, in 2022, China's population aged 60 years and above numbered approximately 280 million, accounting for 19.8% of the national population (Yang et al., 2023). However, there is a significant shortage of professional caregivers in China.

Therefore, studying how developed countries utilize AI in elderly care is crucial for addressing China's aging population dilemma.

## 2. Current Application of AI and Its Potential Risk

### 2.1 Daily Healthcare

According to the study conducted by Tan and Taeihagh (2021), intelligent equipment in Singapore's care homes covers all aspects of daily life for elderly individuals. For example, portable intelligent bathing machines not only enable long-term bedridden elderly individuals to bathe in bed but also include a massage function, ensuring their privacy and sense of security. Nursing homes in Japan have also implemented AI guardian products such as the 'invisible caregiver', which employs AI technology for functions such as fire, fall, and wandering monitoring to increase elderly safety (Carbonaro et al., 2018). In the United States, caregivers utilize a vital sign monitoring system through Internet of Things devices to track the health of elderly people more effectively and ensure their safety (Padhan et al., 2023).

### 2.2 Chronic Disease Monitor

Long-term care (LTC) for elderly individuals includes various detailed functions. Nursing procedures include wound care, chronic disease management, and routine health evaluations. However, achieving these functions is challenging due to labor force shortages and issues such as negligence, carelessness, or laziness (Tan & Taeihagh, 2021).

According to the Singapore Ministry of Health (MOH), since 2014, the MOH has launched two national-level projects to promote the use of robots and autonomous systems in Singapore's LTC sectors (Taeihagh, 2021). One of these initiatives is The Centre for Healthcare Assistive and Robotics Technology (CHART), formally established in July 2015. CHART aims to enhance medical education, optimize rehabilitation and automation processes, establish virtual hospitals, revolutionize aged care, and develop virtual hospitals through the integration of robots and assistive technology in healthcare. With the establishment of CHART, robots and autonomous systems can serve as valuable surveillance tools to monitor the health and living conditions of senior citizens (Lele, 2019). Examples of autonomous systems include wearable technology, motion sensors, and telemonitoring robots, which can monitor elderly patients' medication adherence, remind them of appointments and daily tasks, and track vital signs to prevent the onset of chronic diseases (Taeihagh, 2021).

### 2.3 Technological Problems and Ethical Concerns

Despite the strong encouragement of smart aging from policies and favourable reception from the outside world, many aspects of smart aging equipment still need to be better integrated into the lives of elderly individuals. In terms of technology, product design, and commercialization, smart aging technology faces several challenges. Technologically, current AI advancements have not yet fully met the needs of elderly individuals. At this stage, technology cannot completely replace manual services or fully automate elderly care (Lele, 2019). It can only somewhat reduce the workload for family members and care personnel. In terms of product design, practitioners must consider the differences between elderly users and younger people and adjust designs accordingly to accommodate aging needs. For example, the UI and interaction design of smart elderly products should address issues related to vision and hearing, and product logic should be as simple and efficient as possible (Taeihagh, 2021).

The application of AI in healthcare requires the use of the internet for information transmission and processing and therefore faces security threats from the internet. Cyberattacks and virus transmission may steal, tamper with or destroy the personal information and health data of older persons, resulting in serious consequences (Singareddy et al., 2023). In addition, malware and phishing websites may induce older persons to disclose their personal information and cause property losses. Therefore, preventing cybersecurity threats and safeguarding the security of information transmission and processing are also important challenges facing the model (Padhan et al., 2023).

However, we can more effectively address fundamental technological and ethical issues that may arise with robotics and autonomous systems (Singareddy et al., 2023).

## 3. Healthcare Problems for Elderly People in China

From 2018 to 2024, the number of elderly people over 60 years old in China grew rapidly at an annual rate of nearly 5 million. Given the large elderly population, the issue of elderly care has become the greatest problem facing Chinese society (Tong et al., 2024).

*Figure 1: Elderly population in China*

| Year | Elderly Population (millions) |
|---|---|
| 2018 | 240 |
| 2019 | 245 |
| 2020 | 250 |
| 2021 | 255 |
| 2022 | 260 |
| 2023 | 265 |
| 2024 | 270 |

*Source: The State Council of the People's Republic of China.*

Currently, the annual pensions of Chinese seniors, while rising from 2018 to 2024, are less than 1,200 yuan per capita per month, which is simply not enough to pay for high-quality senior care (Yang et al., 2023).

*Figure 2: Average annual healthcare expenditures in China*

| Year | Average Annual Healthcare Expenditure per Elderly Person (¥) | Percentage of Total Spending on Long-Term Care |
|---|---|---|
| 2018 | 8,500 | 25% |
| 2019 | 9,200 | 27% |
| 2020 | 10,000 | 30% |
| 2021 | 11,000 | 32% |
| 2022 | 12,000 | 34% |
| 2023 | 13,000 | 36% |
| 2024 | 14,000 | 38% |

*Source: The State Council of the People's Republic of China.*

As of 2024, there will be a total of nearly 300 million seniors in China, but there are only 800,000 professional healthcare workers. Moreover, many of these workers lack professional training (Tong et al., 2024). Consequently, these healthcare workers are often unable to meet the needs of the 300 million elderly people for professional care. Furthermore, there are frequent reports of elderly people not receiving adequate care in nursing homes and even being subjected to abuse (Tong et al., 2024).

*Figure 3: Healthcare workers in China*

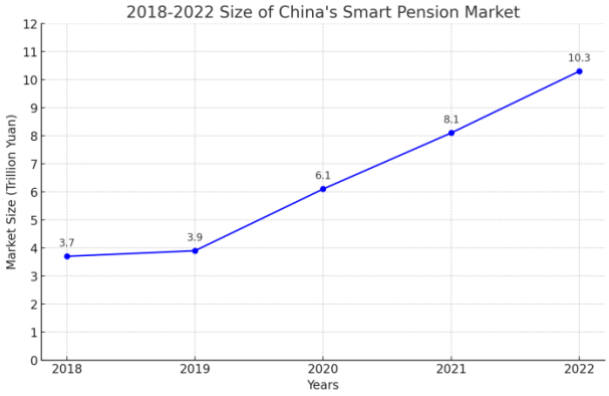
| Year | Healthcare Workers (Thousands) |
|---|---|
| 2018 | 500 |
| 2019 | 550 |
| 2020 | 600 |
| 2021 | 650 |
| 2022 | 700 |
| 2023 | 750 |
| 2024 | 800 |

*Source: The State Council of the People's Republic of China.*

## 4. How AI can be Applied to Help Healthcare for Elderly Citizens in China

A significant quantity of capital has poured into the pension business one after another as a result of China's present economic growth. Particularly in the market for smart pensions, the quality of pensions has significantly increased along with the ongoing growth of the investment scale. This greatly contributed to the development of AI + healthcare in China.

*Figure 4: 2018–2022 size of China's smart pension market*




*Source: China Report Hall.*

It is suggested that smart health care product supply projects for elderly people's daily health care should be applied further. It includes the daily care and maintenance of robots for elderly individuals. Through the use of robots and virtual assistants, elderly individuals can be provided with daily care, companionship and interactive services to alleviate loneliness and depression in elderly individuals (Si, 2019). For example, Japan's "Robear" robot can provide elderly individuals with life care services such as getting up, grooming, dressing, and eating, effectively improving their quality of life and happiness (Zhang & and Oyama, 2016).

By deep mining and analysing vast amounts of historical data, robotics can also evaluate past data and forecast hazards. Robotics can identify patterns and trends in long-term health data of the elderly to anticipate possible health issues by compiling and analysing the data (Si, 2019). By examining variations in blood pressure, it may be possible to predict the risk of hypertension; moreover, the risk of complications from diabetes can be predicted by monitoring variations in blood glucose. For older persons and their families, these forecasts can serve as crucial guides for taking proactive steps ahead of time to stop the disease from progressing (Tong et al., 2024). Therefore, intelligent robotics should be applied to monitor chronic diseases.

Smart home technological robotics make it much easier for older people who have mobility issues to manage their house. By using voice commands or smartphone apps, senior citizens can effortlessly control their temperature, open and close curtains, turn on and off air conditioning, and choose their favourite TV shows without having to get up from their chairs (Si, 2019). This increases their level of independence and comfort. Elderly people are less physically burdened by this convenience, which also gives them more confidence to live freely (Taeihagh, 2021).

## 5. Conclusion

The intelligent aging industry continues to show favourable development patterns despite China's growing population aging issue and the lack of regulations related to intelligent aging. On the one hand, the purchasing power of senior citizens for smart aging products is increasing dramatically. Increasing living and economic standards are leading more seniors to spend more on these items. This trend not only drives the growth of the intelligent aging market but also enhances its diversity and vibrancy. On the other hand, the Chinese intelligent aging market has benefited from global advancements in AI technology and smart aging products. Significant progress has been made internationally in the study and application of intelligent aging technologies. These cutting-edge products and technologies provide China with invaluable expertise and insights, fostering innovation and progress in the country's intelligent aging sector. However, many challenges remain to be overcome both in China and worldwide in the invention and advancement of intelligent aging products. This calls for ongoing advancements in technology, as well as extensive modifications and adjustments in legal, regulatory, and ethical frameworks. Truly realizing the full potential of intelligent aging will require collaboration and cooperative efforts from multiple parties.

In summary, the development potential of China's intelligent aging sector remains broad, despite existing concerns and obstacles. China's intelligent aging industry is poised to improve the future, driven by the rising purchasing power of the elderly and a thriving market, alongside the adoption and integration of advanced

foreign technologies. Moreover, supporting the industry's sustainable growth will necessitate addressing the moral, legal, and ethical concerns associated with smart aging technologies.

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## Conflicts of Interest

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