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Promoting older adults' social health with AI in the healing industry: Service process design and loneliness prevention strategies

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Abstract
Under the global trend of population ageing, social isolation and loneliness have emerged as public health issues that can no longer be neglected, and their adverse effects on health are comparable to those of established risk factors such as smoking and obesity, with a particularly profound impact on older populations. As one of the core dimensions of holistic health, social health is interwoven with physical, mental and spiritual health, and together with them determines an individual's overall state of well-being. As community care systems have matured and digital technology has advanced, social-health interventions have expanded from traditional volunteer visits and isolated community activities into a diversified range of models, including social prescribing, health communities, senior co-housing and AI-based virtual companionship. These models offer new solutions for loneliness prevention and social support in an ageing society, while at the same time giving rise to ethical challenges such as algorithmic bias, the digital divide and privacy risk. The present study was designed to examine systematically the theoretical foundations of social health, the development of the service industry and the application of digital technology, and to construct an age-friendly, integrated AI community-service architecture. First, the mechanisms linking social connectedness, belonging and health were reviewed, the behavioural, physiological and psychological pathways through which social support influences health were analysed, and large-scale epidemiological evidence was used to describe the concrete effects of loneliness and social isolation on mortality, cardiovascular disease, cognitive function and health-care utilisation. Second, the operating logic and practical value of industry models including social prescribing, community care, health communities and co-housing were examined, together with the institutional challenges and success factors of cross-sector collaboration and the practical strategies of Online-Merge-Offline (OMO) community operation. Third, the applied value of Social Network Analysis (SNA) in risk detection and community assessment, the benefit boundary of AI virtual companions and social robots, and ethical governance issues concerning algorithmic bias, privacy risk and the protection of vulnerable groups were discussed in depth. Finally, five design principles, a five-stage integrated service process and five diversified business models for age-friendly AI community services are proposed, and a cross-domain ecosystem in which health care, social welfare, industry, government and academia collaborate is constructed.

Keywords: Social health, loneliness, older-adult services, social prescribing, social network analysis, AI virtual companionship, age-friendly technology

Introduction

In the twenty-first century, global health systems are confronted with the severe challenge presented by population structural ageing. According to the United Nations Department of Economic and Social Affairs (UN DESA) Population Division (2022) [9], the proportion of the population aged 65 and over has risen from 6.9% in 2000 to 10.5% in 2025, and it is projected to reach 16% by 2050. Population ageing not only brings about physiological-health problems such as an increasing burden of chronic disease and expanding demand for long-term care, but also conceals a public-health crisis that is readily overlooked: the systemic spread of social isolation and feelings of loneliness. Epidemiological research conducted over the past two decades has repeatedly confirmed that weak social connectedness and loneliness constitute major independent risk factors for health. A meta-analysis by Holt-Lunstad *et al*. (2010) [3], which integrated 148 longitudinal studies encompassing more than 300,000 participants, found that individuals with weak social relationships exhibited an all-cause mortality rate 1.5 times higher than that of individuals with strong social relationships, a risk magnitude exceeding the effects of abnormal body-mass index (BMI) and physical inactivity. This finding has fundamentally overturned the popular perception that social contact is merely a recreational element of life unrelated to health, and has elevated social connectedness to a public-health issue on a par with smoking and obesity. Research focused on older populations further indicates that loneliness is not only strongly associated with depression and cognitive decline but also raises the incidence of cardiovascular disease, lowers immune function and increases the risk of premature death (Valtorta *et al*., 2016) [10]. As the conception of health has shifted from "the absence of disease" towards "holistic health", social health, as one of its core dimensions, has received increasing attention from academia and practice. Unlike the quantitative indicators of physical health and the symptom-based assessment of mental health, social health concerns the deep influence of interpersonal-relationship quality, social-support networks, a sense of belonging and community participation on health. Traditional health-management systems have long concentrated on physiological indicators such as blood pressure and blood glucose, and on psychological symptoms such as depression and anxiety, while relatively neglecting the far-reaching influence of the social dimension on health. As a consequence, the loneliness and social isolation of many older persons have failed to be detected and intervened upon

in good time, eventually deteriorating into physical and psychological illness and in turn increasing the burden on medical and long-term care systems.

On the supply side, models of social-health intervention are evolving rapidly. Traditional passive visit services, delivered primarily by social-welfare agencies and volunteers, have expanded into a diversified industrial landscape: the social-prescribing system formally links community resources with primary-care services and has become an important mechanism by which primary care addresses psychosocial needs; novel services such as health communities, membership clubs and senior co-housing offer more active and autonomous options for social participation, meeting the varied needs of older persons in different health states and socioeconomic circumstances; and the Online-Merge-Offline (OMO) operating model has removed temporal and spatial constraints, thereby widening the accessibility and frequency of social services. At the same time, the development of digital technology has brought new opportunities and challenges to social health. Social Network Analysis (SNA) can quantify and depict the structure of an individual's interpersonal network and the overall pattern of community connections, identify high-risk groups for isolation at an early stage, and evaluate objectively the effectiveness of community interventions. AI-based virtual companions and social robots, acting as supplementary sources of support, provide twenty-four-hour emotional companionship, cognitive stimulation and safety monitoring for high-risk older persons such as those with dementia or those living alone. Despite rapid development of the field, three core gaps remain. First, theory and practice in social health have long been dispersed across sociology, public health, long-term-care management and information technology, and an integrated framework centred on health management is lacking. Second, most discussions focus on the effectiveness of a single service model, and systematic treatment of practical issues such as OMO integrated operation and cross-sector coordination is insufficient. Third, discussions of AI technology in social health frequently remain at the level of optimistic technical narrative, and treatment of risk governance, vulnerable-group protection and age-friendly design is not sufficiently deep. Against this background, the present study was intended to integrate social-health theory, service-industry practice and digital-technology applications, and to construct an integrated management model for older-adult social health that balances human warmth with technological efficiency.

Theoretical Foundations and Empirical Evidence of Social Health

1. Social Connectedness, Belonging, and Physical and Mental Health

Social health is one of the core dimensions of holistic health and refers to a stable state in which an individual is able to establish and maintain satisfying interpersonal relationships, adapt to the social environment, obtain adequate social support and experience a sense of belonging. Unlike the pathological assessment of "impaired social functioning" used within the medical system, social health places greater emphasis on subjective relationship quality, feelings of support and group belonging, and constitutes a deep social determinant that influences physical and mental health. Public health has long treated social factors merely as control variables rather than as core targets of health intervention; with the accumulation of epidemiological evidence, however, the importance of social health as a health determinant has been increasingly accepted as consensus.

Social connectedness, the foundation of social health, refers to the strength of social bonds between an individual and other persons or communities, and comprises structural and functional dimensions. Structural social connectedness denotes the objective pattern of the network, including its size, interaction frequency, diversity of relationship types and overall network density; functional social connectedness denotes the substantive support functions that the network can provide, and constitutes the mediating mechanism through which connectedness influences health. It has been widely accepted by prior research that social-support networks ordinarily perform four core functions, each exerting a protective effect on health at a different level. First, emotional support, expressed through affection, empathy, trust and acceptance, constitutes the principal source of belonging and the most important protective factor in stress coping. For older persons, the presence or absence of emotional support often predicts mental-health status more strongly than instrumental support and represents the core resource against loneliness. Second, instrumental support provides tangible material assistance and practical help, such as care and company, assistance with tasks and financial support, forming an important backstop for independent living; when older persons encounter reduced mobility or recover from illness, instrumental support enables them to weather difficulties and prevents deterioration in quality of life. Third, informational support provides advice, messages and feedback that assist individual decision-making and problem-solving, such as information on medical care, welfare resources and practical knowledge; for older persons with weaker information-acquisition capacity, informational support within the network helps them to obtain necessary resources and prevents loss of entitlements. Fourth, appraisal support offers affirmation, encouragement and a frame of social comparison, helping the individual to establish a sense of self-worth and maintain self-esteem and self-efficacy. Particularly during role transitions such as retirement or bereavement, appraisal support assists older persons in rebuilding self-identity and adapting to new life circumstances. The influence of social connectedness on health is not an abstract psychological feeling but operates through identifiable behavioural, physiological and psychological pathways, which interweave to affect overall health status. The first pathway is behavioural. Social networks shape individual health behaviour through social norms, peer influence and supportive supervision: the support of family and friends encourages regular medical attendance, medication adherence, exercise and a balanced diet; conversely, isolated individuals lack supervision and motivation for health behaviour and are more prone to adverse lifestyles such as smoking, excessive alcohol consumption, prolonged sitting and non-adherence to medical advice. Good social support also increases the willingness to seek medical help and prevents disease deterioration caused by delayed care. An overview by Leigh-Hunt *et al*. (2017) [4], integrating several systematic reviews, indicates that delayed presentation and poor medication adherence are significantly more prevalent

among socially isolated persons than among those with strong social connectedness, and this constitutes one of the important reasons for the poorer health outcomes of isolated individuals.

The second pathway is physiological. Chronic social isolation and persistent loneliness continuously activate the hypothalamic–pituitary–adrenal (HPA) axis, resulting in chronically elevated stress hormones such as cortisol, which in turn gives rise to chronic low-grade inflammation, immune suppression, elevated blood pressure and abnormal coagulation. Under sustained high stress-hormone conditions, vascular endothelium is continually damaged, and lipid regulation and insulin sensitivity are disturbed, ultimately raising the risk of cardiovascular and metabolic disease; immune suppression also impairs defence against infection and tumour surveillance. A meta-analysis by Valtorta *et al*. (2016) [10], encompassing 180,000 participants, confirms that social isolation and loneliness increase coronary-heart-disease risk by 29% and stroke risk by 32%, a physiological mechanism closely related to the pathways described above. The third pathway is psychological. Good social support provides an outlet for emotional expression and a stress-buffering effect, reducing the impact of adverse events. The Stress Buffering Hypothesis holds that social support moderates the adverse effects of stressful events on physical and mental health: when confronted with the same stressor, individuals with strong support sustain markedly less physical and psychological damage. Moreover, belonging and positive interpersonal interaction elevate positive affect, self-esteem and a sense of meaning in life, foster psychological resilience and facilitate recovery in adversity. A five-year longitudinal study by Cacioppo *et al*. (2010) [2], conducted among older residents of Chicago, found that loneliness significantly predicted subsequent worsening of depressive symptoms, and the effect remained significant after baseline depression and demographic variables had been controlled. A vicious cycle is thus formed: loneliness leads to depression, and depression in turn reduces willingness to socialise, deepening loneliness further. The meta-analysis by Holt-Lunstad *et al*. (2010) [3], integrating 148 longitudinal studies with a total sample exceeding 300,000 persons, is the most landmark study in the field of social health and established the academic standing of social connectedness as a health determinant. After controlling for confounders such as age, socioeconomic status and baseline health, it was found that individuals with strong social relationships exhibited significantly higher survival rates than those with weak relationships, with an overall odds ratio of 1.50; in other words, insufficient social connectedness raises the risk of death by 50%, an effect exceeding the risk magnitude of obesity and physical inactivity. Further analysis indicates that different facets of social connectedness carry independent protective effects: objective network size, marital status and frequency of community participation, together with subjective feelings of social support and degree of loneliness, are all significantly associated with mortality. Multiple social connections—simultaneously comprising relationships at the family, friendship and community levels—confer the strongest protection, whereas reliance on a single support source yields comparatively weak protection. This implies that loneliness prevention cannot rely solely on strengthening family support; older persons must also be assisted in expanding networks of friends and community to build a more resilient social-support system.

2. Loneliness, Population Ageing, and the Transformation of Social Support Networks

Loneliness, the most central manifestation of impaired social health, constitutes one of the gravest challenges faced by contemporary ageing societies. As ageing has advanced, loneliness has evolved from an individual psychological feeling into a public-health issue affecting population health. Loneliness is defined as the subjective dissatisfaction arising from a discrepancy between the desired quality or quantity of social relationships and the actual social relationships experienced. It must be emphasised that loneliness differs from social isolation: social isolation denotes objectively low frequency of interpersonal contact and a small network, whereas loneliness is a subjective psychological state. Some persons may feel lonely despite frequent social contact, because relationships lack intimacy and deep connection; others, despite living alone and socialising little, do not feel lonely because they are satisfied with existing relationships. The two concepts are, however, highly correlated and both exert adverse effects on health. Loneliness may be broadly divided into two types, which frequently coexist in older persons. Emotional loneliness stems from the absence of an intimate attachment relationship—for example, the emptiness following the death of a spouse or the departure of close relatives—and is usually intense and deeply felt; social loneliness stems from the absence of an integrated social network and a sense of belonging, for example withdrawal from the workplace community after retirement or relocation away from friends and family, and is usually milder but, when accumulated over time, equally damaging to health. Older populations are commonly exposed to both forms simultaneously: as age advances, the loss of relatives and friends and the withdrawal of social roles occur together, constituting a double blow. From a temporal perspective, loneliness may further be distinguished into state loneliness, a transient feeling triggered by specific situations and a normal experience accessible to everyone, and trait loneliness, a long-term stable feeling related to personality and enduring environments and the principal source of health risk. In general, occasional state loneliness does not harm health and may even promote self-reflection; it is persistent trait loneliness that constitutes the public-health issue requiring intervention.

The prevalence of loneliness among older populations worldwide ranges approximately from 10% to 40%, the variation being attributable mainly to differences in definition, measurement instruments and culture. The overview of systematic reviews by Leigh-Hunt *et al*. (2017) [4] indicates that a substantial minority of community-dwelling older persons experience severe loneliness, and that a larger proportion experience occasional or moderate loneliness. In countries that have entered super-aged society, the proportion of severe loneliness generally rises further, because the prevalence of living alone, bereavement and functional impairment increases with ageing. Multiple factors influence the risk of loneliness in later life. Demographically, living alone, bereavement, being single, advanced age (80 years or over) and female sex are recognised risk factors; socioeconomically, low educational attainment, low income and loss of social role after

retirement raise risk; in health terms, reduced mobility, chronic disease, cognitive impairment and sensory deficits restrict social participation and thereby increase the probability of loneliness; environmentally, urban residence, weak neighbourhood ties and high social mobility are associated with higher loneliness than close-knit rural communities. Overall, the more disadvantaged the older person, the higher the risk of loneliness, a pattern characteristic of health inequality. The health harm of loneliness to older persons is comprehensive, spanning psychological, cognitive, physiological and health-care-utilisation dimensions. In psychological terms, loneliness is one of the strongest risk factors for depression: the loneliness-depression cycle reported in the Chicago longitudinal study (Cacioppo *et al*., 2010) [2] was observed: loneliness predicted subsequent worsening of depressive symptoms, and depression in turn reduced willingness to socialise. Beyond depression, loneliness is strongly associated with anxiety, low self-esteem and reduced life satisfaction. In cognitive terms, loneliness is associated with elevated dementia risk: persistently lonely older persons experience significantly faster cognitive decline and a markedly increased risk of Alzheimer's disease. In physiological terms, the meta-analysis by Valtorta et al. (2016) [10], covering 180,000 participants, shows that social isolation and loneliness raise coronary-heart-disease risk by 29% and stroke risk by 32%, an effect approaching that of traditional risk factors such as smoking. Perissinotto *et al*. (2012) [7] further found that lonely older persons exhibit faster functional decline, higher disability risk and significantly elevated all-cause mortality; even after baseline health was controlled, loneliness remained an independent predictor of death, indicating that loneliness is not merely an outcome of poor health but one of its causes. In terms of health-care utilisation, lonely older persons make significantly greater use of emergency care, hospital admission and medical expenditure than non-lonely persons, partly because of poorer health and partly because the absence of family accompaniment and reminders leads either to presentation for minor symptoms or to delayed presentation until illness becomes severe; both patterns increase the burden on the health system.

After entering later life, an individual's social-support network often undergoes structural shrinkage and transformation, which constitutes the structural cause of the high prevalence of loneliness in old age. First, the workplace network is severed: retirement removes daily colleagues and the sense of belonging to a work community, and many retirees are unable to find alternative channels of social participation, with a sharply contracted social circle—an effect particularly strong for persons whose work and personal life overlapped heavily. Second, the core network withers: relatives and friends gradually die or fall ill, continuously reducing the small set of strong-tie relationships; older persons attend funerals with increasing frequency, and each loss imposes a major shock on the support network, which may collapse into deep loneliness once core members fall below a critical threshold. Third, mobility limitations increase: declining mobility, chronic disease and sensory impairment make physical social participation difficult, and many older persons withdraw from active community involvement into the home because of reduced mobility or poor hearing, leaving progressively fewer interaction partners and ultimately only a handful of family members. Fourth, family support weakens: the miniaturisation of the family, the declining number of children and their geographical dispersion erode the function of the traditional family as the principal support source; although many families act out of filial piety, the substantive company they can provide is limited by time, distance and work pressure. Social-network theory distinguishes strong ties (intimate family and close friends), which provide deep emotional support, from weak ties (acquaintances, neighbours and community contacts), which provide diverse information, broaden horizons and confer community belonging. In older persons, weak ties typically disappear first, shrinking the life world until only a few core relatives remain; once those are lost, deep isolation readily follows. Assisting older persons in rebuilding and extending weak ties and participating in community activity is therefore among the most important strategies for loneliness prevention.

3. Ageing-Related Challenges to Social Health

Social-health issues in an ageing society face three structural challenges that cannot be resolved by individual adaptation alone and must be addressed at the institutional and environmental level. First, the family-support function has weakened systemically. Low fertility, nuclear-family formation and children taking employment elsewhere have rendered the traditional "rearing children for old-age support" model progressively dysfunctional; a growing number of older persons live alone or as a couple, with limited dependent family care resources, and the source of social support must therefore expand from the family to the community and wider society. This is precisely why community care and social participation have become core elements of ageing policy: support functions formerly borne by the family must now be shared among community, government and industry. Second, community social capital has eroded. Urbanisation and population mobility have disrupted the close bonds of traditional neighbourhood societies; modern community relationships are distant and mutual-aid functions weak. Many older residents have lived in an area for decades yet do not know the neighbours next door, lacking a local support network. Older communities lose vitality through population ageing and out-migration, while new communities, characterised by heterogeneity and infrequent interaction, find it difficult to accumulate social capital. Third, the digital divide amplifies inequality. Online socialising and digital services are becoming ubiquitous, extending the possibilities of social connection for younger generations; for older persons with insufficient digital competence, however, they constitute a new form of social exclusion. Loneliness and social isolation are not individual personality problems of older persons but structural social issues that cannot be solved by personal adjustment alone; joint intervention by government, community, industry and civil-society organisations is required to build a supportive social-health system across institutional, service and environmental levels.

Social Health Service Systems and the Development of the Older-Age Industry

1. Social Prescribing and Community Health Promotion

Among the many models of social-health intervention, social prescribing has attracted the greatest policy attention

in recent years and constitutes the key mechanism linking the medical system with community resources; it is regarded as an important method by which primary care responds to the social determinants of health. Unlike a conventional pharmaceutical prescription, social prescribing does not dispense medication but rather community resources and social-support services, with the aim of addressing at root the social problems that influence health. Social prescribing refers to the issuance, by primary-care professionals (such as general practitioners, nurses and care managers), of a non-pharmaceutical "prescription" for patients with psychosocial needs, who are then referred to community social-support services and activities. Common referrals include community exercise classes, arts therapy, horticultural therapy, communal dining, volunteer service, befriending, debt counselling and employment support. Its core rationale is that many health problems originate in social factors—loneliness, poverty and social exclusion—which cannot be cured by medication alone and require community resources to resolve underlying causes. A complete social-prescribing system ordinarily contains three interlocking stages forming a service chain. The first stage is identification and referral: clinicians identify patients with social needs during routine screening in outpatient settings. The second stage is consultation and matching: a dedicated link worker discusses needs, interests and goals with the individual on a one-to-one basis, develops a thorough understanding of the person's circumstances and preferences, and matches suitable community services and resources, while also helping to remove barriers to participation. The third stage is support and follow-up: engagement is monitored continuously, problems encountered during participation are addressed, changes in health and social function are tracked periodically, and services are adjusted or referral returned to the medical system where necessary; the case is gradually closed once the person has made stable progress and can sustain participation autonomously. Unlike conventional medical referral, social prescribing emphasises a person-centred approach that values individual interests and choices rather than allowing experts to decide what is best for the client. The intervention goal extends beyond symptom reduction to strengthening social participation, rebuilding support networks and enhancing self-efficacy, helping the individual to recover the capacity for autonomous living.

Social prescribing originated in primary care in the United Kingdom during the 1990s and, after receiving national policy support from 2010 onwards, became a formal institution within the National Health Service (NHS) system. Two underlying drivers may be identified: first, the health system faced a growing volume of psychosocial presentations that conventional medical treatment addressed only weakly, with demand continuing to rise and remain unmet; second, communities held abundant voluntary organisations and volunteer resources that lacked a formal link to the medical system, so that resources were underused and many persons in need were unaware of them. Social prescribing precisely bridges the two ends, matching demand on the medical side with resources on the community side. International experience indicates that social prescribing yields multi-level benefits: at the individual level, it significantly improves mental health, reduces anxiety and depressive symptoms, and enhances social participation and quality of life; at the health-system level, it reduces primary-care consultation frequency and emergency admission rates and improves the efficiency of resource use; at the community level, it activates local resources, fosters the development of local associations and voluntary services, and generates a diffusion effect. These benefits echo epidemiological findings: when social-support needs are met, loneliness declines, health improves and health-care utilisation falls, corroborating the importance of social health as a determinant: intervention at the social level often produces deeper and more durable health benefits than purely medical intervention. Social prescribing is not merely an auxiliary medical service but also an important engine of community health promotion, exerting a point-to-area diffusion effect. First, it activates community resources: in order to meet referral demand, communities develop more diverse health-promotion activities that benefit residents beyond the referred individual, producing a "prescribe for one person, energise the whole community" effect. Second, it changes the mindset of clinicians, extending the focus from "prescribing medicine to treat disease" to "seeing the whole person", emphasising the social determinants of health, promoting a holistic perspective in primary care and deepening the clinician–patient relationship. Third, it facilitates cross-sector collaboration, breaking down administrative walls between medicine and social welfare so that resources flow more efficiently, enabling different units to recognise one another's value and establishing long-term cooperative relationships.

2. Older-Age Services, Community Care, and Cross-Sector Collaboration

The delivery of older-adult social-health services depends on an extensive community-care network and smooth cross-sector coordination mechanisms. As ageing in place has become a global consensus, the community has become the principal setting for older-adult health services, and cross-sector collaboration determines whether services can actually reach the population. Compared with institutional care, community care allows older persons to live in familiar surroundings, retain existing interpersonal networks, and do so at lower cost and in greater accordance with their preferences. Community services centred on social health may be broadly classified into several types, ranging from passive care to active participation and covering the needs of older persons at different risk levels. First, care-visit services: volunteers or care workers make regular visits to isolated and disadvantaged older persons to provide greetings, company and practical assistance, constituting the most basic loneliness-prevention service. Second, communal-dining services: regular shared lunches or afternoon tea provide not only nutritional supplementation but, more importantly, fixed occasions for social interaction and neighbourhood bonding. Third, lifelong-learning courses: talent, language, digital-learning and health-lecture classes provide settings for learning and social contact while preserving cognitive function, and peer relations formed naturally during courses often extend into friendships beyond class. Fourth, volunteer opportunities: younger, healthier older persons are encouraged to volunteer for the community or to assist more frail elders, deriving a sense of value and belonging in return. Fifth, dementia-prevention and delay programmes: combining cognitive stimulation, exercise and social interaction to delay

cognitive decline while providing social support; for older persons with mild cognitive impairment, group courses also reduce social isolation and prevent withdrawal from social circles because of cognitive deterioration. Older-adult social health spans health, social welfare, education, civil affairs, labour and digital affairs, so that no single agency can resolve it alone: social prescribing involves the health and social-welfare bureaux; lifelong learning involves the education and culture bureaux; and digital equity involves the digital-development authority and the health-and-welfare ministry. The absence of cross-sector integration commonly leads to duplicated and wasteful resources, service gaps and citizen confusion, and substantially dilutes policy effectiveness. Cross-sector collaboration between health and social care is widely advocated but faces numerous practical challenges. First, goals and priorities differ: each sector has its own operational objectives, budget allocations and performance indicators, making consensus difficult. Second, administrative procedures and information systems are incompatible: separate workflows, personal-data regulations and systems impede data sharing, so referral requires manual re-entry, which is inefficient and prone to chain breaks; personal-data legislation also constitutes a significant barrier to cross-agency sharing, preventing effective circulation of case information. Third, professional cultures and terminology differ: medicine, social welfare and education each possess their own jargon, values and working culture, producing high communication costs, misunderstanding and friction. Fourth, political and personnel turnover undermines stability: cross-sector collaboration often depends on the support of a senior leader, and a change of government or personnel can alter policy priorities and interrupt cooperation, with no institutionalised mechanism for sustainability.

3. Health Communities, Membership Schemes, and Co-Housing

Beyond government-led community-care systems, civil society has developed diversified social-health services, among which health communities, membership schemes and senior co-housing are the three most representative types, addressing older persons with different spending power and needs. A health community is a group assembled around shared health issues, lifestyles or interests that promotes mutual health through peer support, information sharing and collective action. Unlike passive receipt of services, health communities emphasise participant initiative and peer influence, whose persuasive and sustained power frequently exceeds professional advocacy. Health communities for older persons may be divided into several types, each with distinct functions and features. (1) Issue-based communities: mutual-support groups formed around a specific disease (e.g. diabetes, hypertension, caring for a relative with dementia) or health theme, in which members share experience, support one another and learn together; peer experience is often closer to real life and more persuasive than health-education handbooks, and provides emotional support and practical advice that professionals cannot supply to persons facing the same disease challenge. (2) Interest-based communities: clubs organised around talents, sports and learning. (3) Geographic communities: place-based local groups built on residential proximity. The health benefits of health communities have been widely validated: peer support improves health-behaviour adherence, mood and disease-coping capacity, and reduces loneliness. For older persons, club participation is an important channel for maintaining social participation, expanding interpersonal networks and preventing loneliness. The strength of the community lies in being "together in participation" rather than "being served": participants are simultaneously recipients and contributors, and this bidirectional relationship more readily yields belonging and a sense of value. As the health industry has developed, an increasing number of private institutions operate older-adult health communities on a membership basis. The core rationale of the membership scheme is that regular subscription fees confer access to members-only courses, activities, facilities and services. For operators, membership yields stable, predictable recurring revenue that facilitates long-term planning and service optimisation, while cultivating belonging and loyalty and establishing long-term customer relationships. Common older-adult membership services include lifelong-learning clubs, silver-age sports centres, cultural-arts academies and health-management centres. Successful membership operation rests on several priorities. First, rich and tiered content: activities of varying difficulty and type meet diverse needs and allow members to adjust participation as their capacity changes; graded courses from introductory to advance extend the participation cycle. Second, community-cohesion management: rather than merely selling courses, operators cultivate interpersonal bonds and belonging through social events, seasonal gatherings, small-group mutual aid and birthday celebrations; renewal rates rise naturally when cohesion is sufficient. Third, personalised service: activity recommendations and health reminders tailored to members' health state, interests and needs make members feel valued; digitalisation has substantially lowered the threshold for personalisation and constitutes a point of differentiation. Fourth, clear membership benefits and perceived value: paid membership must deliver commensurate value to support renewal; beyond substantive services, psychological value such as identity and prestige matters.

4. Online-Merge-Offline (OMO) Community Operations

The diffusion of digital technology has driven older-adult community services from purely physical provision toward the Online-Merge-Offline (OMO) model, a transition greatly accelerated by remote-service demand during the COVID-19 pandemic. Community services are now offered through deeply integrated online and offline channels that create a seamless experience rather than relying on a single physical option. OMO community operation integrates online digital platforms with offline physical activity so that the two reinforce one another: the online platform handles daily information delivery, interaction, activity registration, remote companionship and data management, while offline provision delivers deep interpersonal interaction, hands-on courses and face-to-face services. The two channels do not replace but complement one another: online compensates for temporal and spatial limits offline, and offline compensates for the emotional depth that online contact cannot provide. Compared with purely physical or purely online models, OMO offers distinct advantages. First, accessibility is enhanced: older persons with reduced mobility, remote residence or poor weather can still participate online without breaking community ties, which

particularly benefits remote and mobility-limited elders and greatly widens coverage. Second, participation frequency increases: physical activity typically occurs weekly, whereas daily online interaction can reinforce community cohesion; light daily contact maintains community warmth and prevents connection from lapsing when physical courses end. Third, service content is enriched: online delivery can introduce remote lectures, digital courses and AI companionship to compensate for local resource limits, and can bring in external instructors and programmes to raise content quality. Fourth, data-driven optimisation: participation data accumulated on the online platform allows member needs and behavioural patterns to be understood more precisely and used as a basis for service improvement.

Digital Technology in Social Health: Applications and Ethics

1. Social Network Analysis and Community Interaction Assessment

Social Network Analysis (SNA) is a graph-theory-based set of methods used to depict, quantify and analyse the relational structure between persons. With digitalisation, SNA has been increasingly applied in health as a tool for assessing social-support networks, detecting isolation risk and measuring community-intervention effectiveness. Unlike a single conventional scale, SNA renders otherwise invisible relational structure and supplies finer-grained network information. SNA represents a social network as a graph composed of nodes and edges: nodes represent individuals or units, and edges represent relationships between them, such as friendship, kinship, interaction and support; edges may be directed and weighted to reflect the direction and intimacy of a relationship. Mathematical and graph-theoretic methods yield network metrics that quantify network characteristics. As a mature analytical method, SNA has been widely applied to health-care teamwork, infectious-disease transmission pathways, the diffusion of health behaviour and social-support networks, and constitutes a powerful tool for understanding the social context of health. Compared with a single-item loneliness scale, SNA provides finer information on relational quality, structure and distribution rather than a purely subjective score.

In older-adult social health, SNA has three core application scenarios, operating at the individual, community and evaluation levels. First, individual-level risk assessment: by mapping the support network of a given older person, network size, composition and support functions can be quantified to identify high-risk persons with small networks or inadequate support, who are then prioritised for care and intervention; SNA reveals weaknesses in network structure more subtly than a single-item loneliness measure. Second, community-level structural analysis: for residential or membership health communities, SNA can depict the interaction network of the whole community and assess cohesion, core members and peripheral members; analysing the interaction network of communal-dining participants, for example, reveals who functions as the community's core figure and who participates only at the periphery and is prone to attrition, informing strategies to strengthen bonds. Third, objective evaluation of intervention effectiveness: conventional evaluation relies on subjective questionnaires vulnerable to bias and social-desirability effects, whereas SNA supplies objective structural metrics by comparing pre- and post-intervention changes in network density, number of ties and proportion of isolated nodes, quantifying the actual outcome of "expanding networks and reducing isolation". Despite its potential, practical application faces challenges: first, data collection is difficult, since conventional SNA requires every respondent to list all network members and tie strength, imposing substantial time and burden on older persons and calling for simplified instruments; second, longitudinal tracking is hard because networks change over time and long-term follow-up is costly; third, privacy is a sensitive issue because network data involve multiple persons and are harder to protect, readily arousing user concern. As digital community platforms develop, these challenges are being progressively addressed: interaction data from online communities are recorded automatically and used for passive SNA, sharply lowering collection costs; passive online data, however, reflect online interaction only and cannot fully represent real support networks, so they must be combined with physical assessment to yield a complete picture. How SNA may be used as a service-improvement tool under privacy protection remains a direction deserving continued exploration.

2. AI Virtual Companions and Social Robots

Rapid advances in artificial intelligence have made virtual companionship and social robots emerging technological options in social health. As supplements to human companions, AI companion products show growing application potential in older-adult loneliness prevention, cognitive stimulation and emotional support, while carrying numerous limitations and controversies. AI virtual-companion products may be broadly divided into software-based and hardware-based types, each with different suitable scenarios and trade-offs. Software-based products—mobile applications, voice assistants and chatbots—provide conversational companionship, daily reminders and cognitive games in software form. Their advantages are low cost and easy access, making them suitable as introductory options; their disadvantage is the absence of physical warmth, resulting in generally lower uptake and easy neglect among older users. Hardware-based products—physical social robots, smart speakers and pet-type robots—possess a tangible form and even facial expression and movement; their advantage is genuine interaction and strong companionship, and pet-type robots in particular are effective at calming persons with dementia; their disadvantages are higher price, limited functions and additional maintenance costs. Common functions for older users fall into five categories, spanning practical utility to emotional support. Daily conversational companionship: casual chat, storytelling, riddles and guided reminiscence to pass time and reduce loneliness—the most basic and frequently used function, filling spare time. Healthy-living reminders: medication, hydration, exercise and medical-appointment reminders that assist regular routine, an especially practical function for forgetful older persons. Cognitive-stimulation training: memory games and general-knowledge quizzes to delay cognitive decline; gamified design allows training effects to be achieved through entertainment. Emergency contact: automatic notification of family or emergency services when an urgent situation is detected; advanced products add fall detection and voice emergency calling, increasing the security of persons living alone. Emotional support: listening to concerns, offering

comfort and encouragement as an outlet for emotional expression; although AI empathy is limited, the product retains value as a first-layer emotional channel.

Accumulated research and practical experience indicate that social-robot intervention yields mild-to-moderate improvement in loneliness and depression, and improves mood and reduces behavioural problems in persons with dementia; beyond mental-health benefits, it can raise medication adherence, lower safety risk for isolated users and increase confidence in using technology. For family caregivers of persons with dementia, AI companionship shares part of the care burden, provides respite and reduces caregiver load. AI virtual companionship nevertheless carries notable limitations and controversies that must be viewed objectively. First, interaction depth is limited: although current AI sustains fluent daily conversation, it lacks genuine understanding and empathy and cannot handle complex emotional issues or deep psychological needs such as grief over bereavement or existential anxiety; interaction remains superficial, and older users may, after initial novelty, perceive a failure of mutual understanding and lose interest. Second, the concern over displacement of real social contact: critics worry that excessive reliance on robot companions may crowd out genuine interpersonal interaction, withdrawing older persons further into the virtual world and weakening real support networks; most current practical observation, however, holds that, when used moderately, AI companionship acts as a "gap-filling" supplement rather than a substitute, and some older users, by practising dialogue with AI, become more confident interacting with real people. Third, acceptance varies: older users with higher education and technological openness show better uptake and outcomes, whereas those who fear technology or possess low digital competence may find products difficult to use or reject them; appearance, voice interface and ease of operation all affect acceptance. Fourth, responsibility and ethics: accountability is unclear when AI gives erroneous health advice or fails to detect an emergency; philosophical questions also remain as to whether robots erode the dignity of older persons or weaken moral responsibility between human beings.

3. AI Risk, Algorithmic Bias, and the Protection of Vulnerable Groups

The application of AI in social health brings opportunity alongside risks that must not be ignored. Algorithmic bias, privacy risk and the digital exclusion of vulnerable groups are the core ethical challenges and the issues that must be prioritised when technology is introduced. Algorithmic bias refers to systematic unfair treatment of specific groups produced by AI outputs. In older-adult social health, three common sources of bias may ultimately compound existing health inequality. First, insufficient representativeness of training data: model performance depends on training-data quality; if data are dominated by young, urban, highly educated groups and omit older, rural, low-SES or demented populations, identification and prediction accuracy for these groups deteriorate. General observation in digital health indicates that most algorithms are developed without adequate consideration of older-population diversity, so effectiveness for disadvantaged elders declines markedly. For example, a voice-interaction AI companion trained only on standard Mandarin of young speakers will show sharply degraded speech recognition for hearing-impaired, heavily accented or fragmented older users, producing a poor or unusable experience; similarly, a loneliness-risk prediction model built solely on urban samples may misclassify the low-social but satisfied state of rural elders as high risk. Second, implicit bias in design logic: teams with relatively homogeneous backgrounds inadvertently embed their own habits and values into the system and overlook disadvantaged users; small typefaces, over-complex steps and excessive reliance on touch gestures, for instance, are not age-friendly. Such design bias widens the existing digital divide, making technology harder for disadvantaged elders who most need assistance, and produces a Matthean effect of "the rich get richer and the poor get poorer". Third, social bias in labels and classification: when AI is used for risk grading and resource allocation, algorithms may replicate or amplify embedded social prejudices; for example, labelling living alone or low SES directly as high risk can produce stigmatisation and self-fulfilling prophecy, ignore individual variation, reinforce stereotypes and generate new inequality. Data related to social health are highly sensitive: personal social networks, loneliness, emotional state, cognitive function and health status are all private information that, if leaked or misused, can cause serious harm through effects on insurance, employment and relationships. Common privacy risks include: collection of conversational content and behavioural data without explicit consent; repurposing personal social-health data for undisclosed uses such as marketing or insurance pricing; insufficient cybersecurity leading to leakage; and incomplete de-identification permitting re-identification. For older persons, privacy risk is more severe: many understand the scope and purpose of collection inadequately to give truly informed consent, and are more vulnerable to fraud and improper exploitation; privacy-protection standards for age-friendly AI services should therefore be higher, information disclosure more plain-language, and complex legal jargon inadmissible as a substitute.

Integrated Design and Business Models for Age-Friendly AI Community Services

1. Design Principles for Age-Friendly AI Community Services

Drawing together the theoretical foundations, service models and technological ethics reviewed above, this section proposes an overall design architecture for age-friendly AI community services as a practical reference. Its core spirit is: human-centred, technology-as-tool, online–offline integration, and risk prevention first. Before details are expanded, five core design principles are established as the supreme guidelines; every function and process must conform to them, so that service essence is not sacrificed for technology. First, older-priority and ease of use above all: every interface and process starts from the cognitive and operational capacity of older users—large type, large buttons, few steps, simple logic—so that frustration never arises; multiple channels such as voice operation and human customer service are offered, and complex operation is never forced on users; every new feature must pass older-user testing before release, and fewer functions that are easy to use are preferred over many functions that are difficult. Second, connection-based, technology as auxiliary: the ultimate goal is genuine interpersonal connection, with technology as medium and tool only; prolonged solo interaction with AI is not encouraged, and technology is

used to catalyse more online–offline human interaction; AI acts as a catalyst that helps elders join real communities rather than replacing real contact, and every technological feature is tested against the standard of whether it supports genuine connection. Third, risk early-warning with human gatekeeping: AI detects anomalies and raises alerts, but all important judgments and interventions are executed by professionals; AI is a warning system, not a decision system, and matters AI may handle automatically (activity reminders, general dialogue) are strictly separated from matters requiring human handling (risk judgment, crisis response); AI never assumes responsibility beyond its capacity, and human judgment always takes priority, with technology responsible only for raising a hand. Fourth, inclusive diversity and bridging the gap: service design incorporates older users of differing digital competence, socioeconomic background and health state; both digital and non-digital channels are provided so that no elder is excluded; sufficient assistance is offered to digitally disadvantaged users, and those who do not use digital services receive equivalent-quality physical service; vulnerable older users, including those with frailty or impairment, should be recruited into the design process rather than only tech-capable elders, and the rights of disadvantaged elders must never be sacrificed by introducing technology (Wegener *et al*., 2023) [11]. Fifth, privacy protection and information transparency: the purpose and scope of data collection are stated clearly, collection is minimised, and privacy is strictly protected; older users retain complete autonomous control and may access or delete their data at any time; undisclosed use and repurposing of personal data for marketing are prohibited; privacy protection is the foundation of trust and the precondition for sustainable operation.

2. Integrated Service-Process Design

A complete age-friendly AI community service contains five stages forming a dynamic service cycle that advances continuously from assessment to optimisation.

Stage 1: Needs assessment and risk grading: At the outset, staff assist the older person in completing a full needs assessment as the basis for subsequent service; assessment proceeds through one-to-one guidance rather than a complex self-completed questionnaire, lowering participation thresholds. It covers four dimensions: social-health assessment, using a simplified social-network nomination method (listing the 5–8 most important supporters) and a short loneliness scale to establish current network size, interaction frequency and degree of loneliness; health-state assessment of basic physical health, cognitive function, emotional state and mobility as the basis for activity advice; interest-preference assessment of past interests, desired learning and preferred activity types as the basis for content recommendation; and digital-competence assessment of proficiency with digital products as the basis for technological assistance. On the basis of results, elders are graded into three risk levels and matched to resources: low risk (intact network, low loneliness, good health) receives mainly autonomous community participation with activity information and personalised recommendation; medium risk (small network, occasional loneliness, mild health concerns) receives active care and peer companionship in addition to community activity, with periodic tracking; high risk (living alone, weak support, severe loneliness, poor health) receives priority one-to-one care and matching of suitable support resources, with referral to social welfare or medical services where necessary. AI may assist data aggregation, risk-grading calculation and suggestion generation at this stage, but final grading and disposition are confirmed by staff to avoid misallocation caused by algorithmic bias; high-risk cases must be manually reviewed to ensure accuracy of judgement.

Stage 2: AI-assisted community grouping and content recommendation. On the basis of assessment, the system helps elders find suitable communities and activities. Conventional community services passively wait for self-registration, so that outgoing, active elders participate increasingly while introverted, passive elders never take the first step; AI personalised recommendation lowers this participation threshold. The recommendation system weighs several factors balancing interest, ability, social connection and diversity: interest fit (prioritising activities matching interests to raise willingness); ability fit (matching difficulty and physical demand to health and mobility); social connectedness (prioritising activities containing known persons or members of similar background to lower entry); diversity balance (recommending varied activity types to avoid echo chambers and encourage network expansion); and participation-history feedback (continually adjusting direction on the basis of prior experience and satisfaction). To avoid algorithmic over-specialisation and echo-chamber effects, a proportion of diverse, unexpected exploration is retained by design rather than optimising accuracy alone (Adamopoulos & Tuzhilin, 2014) [1], and staff provide one-to-one guidance for high-risk elders, ensuring that recommendation extends social networks rather than merely catering to preference. The system also advises community operators on the basis of community attributes and member structure—for example, "a high proportion of peripheral members; plan social events to promote interaction" or "core members over-concentrated; cultivate secondary cores"—helping to strengthen structural resilience.

Stage 3: OMO integrated community service. This stage constitutes the core service body, in which the online platform and offline activity are deeply integrated to provide multiple channels of social participation. Online services, the interface of daily connection, comprise: daily greetings and interaction (morning greetings, mood check-ins, life updates to maintain light but frequent contact); AI companion dialogue (casual chat, storytelling, riddles, guided reminiscence to fill spare time; the system states clearly that this is AI and encourages interaction with real relatives and friends); online courses and lectures (remote learning and health lectures free of mobility and distance constraints); activity registration and notification (one-click enrolment in physical activity with automatic reminders); and peer community exchange (interest-based discussion spaces for photo sharing, mutual encouragement). Offline services, the core of deep connection, comprise: physical courses and clubs (regular talent, sports and learning classes as the principal setting for deep interpersonal bonds); communal dining and social events (regular shared meals, festivals and outdoor outings that promote relaxed informal interaction); volunteer opportunities (encouraging younger elders to volunteer and derive value and belonging); and

care visits (regular visits and substantive assistance for high-risk elders). Online and offline data are fully interoperable: physical participation records sync to the online profile, and online interaction data inform physical activity planning—popular online topics may seed an in-depth physical lecture, and friends met physically continue interacting online to maintain connection. Digital channels complement rather than replace face-to-face contact, and systematic evidence indicates that accessible digital technology, when combined with community-level support, reduces social isolation among older adults (Sen *et al*., 2022) [8].

Stage 4: AI risk early-warning and human intervention. This mechanism ensures safety and quality: the AI system continuously monitors data changes, detects possible anomalous risk and raises proactive alerts that are then handled by human staff. Common alert items include: participation-drop-off warning (a previously regular participant showing prolonged absence of activity and online interaction, possibly indicating physical discomfort, low mood or difficulty, requiring proactive care); negative-emotion warning (explicit negative, hopeless or self-deprecating language in dialogue or posts, or a rising loneliness score); health-anomaly warning (synchronised alert where wearable or health data, if connected, show abnormal change); and social-isolation warning (SNA showing increasing marginalisation and shrinking interaction partners). After issuing an alert, the system takes no automatic action; it notifies the responsible staff member or volunteer, who proactively contacts the elder to assess the situation and provide necessary assistance; where serious risk is identified (suicidal ideation, severe depression, signs of abuse), referral to medical or social-welfare services follows the established mechanism. The key principle is that AI handles "detection and reminder" while humans handle "judgement and disposition": AI may monitor around the clock without missing signals, but final judgement and action remain human, preserving both technological efficiency and human warmth and professional judgement.

Stage 5: Outcome tracking and service optimisation. The system periodically tracks outcomes as the basis for continuous improvement, across four dimensions: social-health indicators (change in loneliness, network size and density, perceived support); participation-behaviour indicators (activity rate, activity level, retention, speed of integration for new members); health-related indicators (life satisfaction, emotional state, self-rated health); and service-quality indicators (user satisfaction, response speed, problem-resolution rate). Algorithmic fairness is audited periodically to detect significant group differences in experience and to correct bias continuously; older representatives are also invited at regular intervals to provide feedback for service and interface improvement. The five stages form a continuously cycling optimisation loop that, as data accumulate and feedback is input, brings service ever closer to genuine user needs.

3. Diversified Business Models

Age-friendly AI community services may, according to target segments and operating entities, develop diversified business models to meet market demand at different levels.

Model 1: Public-funded, privately operated community service: Government allocates budget and commissions professional private organisations to operate community-based older-adult services for local general and disadvantaged elders; this is the most inclusive model and the basic infrastructure for loneliness prevention.

Model 2: Membership health club. Privately operated mid-to-high-end clubs on monthly or annual subscription, offering rich physical courses, activity facilities and online digital services; AI adds value through personalised activity recommendation, virtual companionship and health-risk early warning, raising perceived service value and renewal intention.

Model 3: Long-term-care value-added service: Integrated with home care and day-care services, AI community companionship and social participation are offered as value additions—for example, home care supplies basic physical care and additionally installs AI companion devices, arranges online community activity and physical community participation; targeting disabled or demented high-risk elders, it maintains social connection, slows cognitive decline and reduces caregiver burden, with payment from long-term-care benefits and out-of-pocket purchase.

Model 4: B2B platform licensing: A technology company develops a complete AI community-service platform system and licenses it to long-term-care institutions, social-welfare agencies, clubs and neighbourhood offices, charging system-setup fees, annual licensing fees and usage fees.

Model 5: Home-end smart companion product: AI companion products, comprising hardware and subscription services, are sold directly to households; children purchase them for isolated parents, providing emotional companionship, life reminders, safety monitoring and emergency contact, while linking online community to increase social participation.

The models differ in target segment and operating logic but are not mutually exclusive; many operators run several models in parallel, forming complementary revenue structures that spread operational risk.

4. Building a Cross-Domain Ecosystem

In the long term, the service capacity of any single institution is limited; a complete older-adult social-health support system requires a cross-domain collaborative ecosystem that combines the expertise and resources of different units to create synergy greater than the sum of its parts. A complete ecosystem comprises the following participants in distinct roles: the medical side (primary clinics, hospitals and long-term-care institutions), responsible for health assessment, social-prescribing referral and high-risk case disposition; the social-welfare and community side (welfare agencies, community-development associations and volunteer groups), responsible for local delivery, care visits and event organisation; the industry side (health services, technology firms and cultural-creative industries), providing professional services, technological products and innovative content; the government side (health, welfare, education and digital departments), responsible for policy, subsidy, regulation and cross-sector coordination; and academia, assisting research validation, outcome evaluation and service optimisation. The value of the ecosystem lies in each unit contributing its expertise,

complementing resources and creating aggregate synergy: a medical-side patient identified at loneliness risk is referred into the community system; a community-side health anomaly is reported back for medical follow-up; technology supplies tools to raise efficiency; and government provides policy and funding while preserving service fairness. For the ecosystem to operate smoothly, shared value consensus, clear cooperation interfaces, interoperable information standards and a fair benefit-distribution mechanism must be established; sustainability is possible only when every participant derives value. The ultimate goal of the ecosystem is that every older person receives appropriate social support in the community, remains free from loneliness and enjoys a healthy, dignified old age.

Conclusions

The present study systematically examined the theoretical foundations of social health, service-industry development, digital-technology application and integrated service design, and constructed a complete framework for managing older-adult social health. The principal findings are summarised as follows. First, theoretically, social connectedness and belonging are key factors influencing holistic health, acting on physical and mental health through behavioural, physiological and psychological pathways; large-scale epidemiological evidence shows that social isolation and loneliness significantly raise all-cause mortality, cardiovascular risk, depression and the speed of cognitive decline, with health harm comparable to smoking and obesity, constituting a non-negligible public-health issue. Second, in the service industry, diversified models have developed: social prescribing effectively links medical and community resources and constitutes an important primary-care mechanism for social-health issues; community care supplies local communal dining, courses and care as infrastructure for ageing in place; and health communities, membership schemes and co-housing meet social-participation needs at different levels (Lu, 2026). Third, in digital-technology application, SNA quantifies support structure, detects isolation risk and evaluates intervention effectiveness from an objective network perspective; AI virtual companions and social robots, as supplements to real companionship, reduce loneliness, provide cognitive stimulation and safety monitoring, with mild-to-moderate intervention effect. Fourth, in integrated service design, successful age-friendly AI community services must adhere to the human-centred, technology-as-tool principle, and the complete flow from needs assessment, personalised recommendation and OMO integration through AI early warning to outcome tracking balances service efficiency with human warmth (OpenAI, 2026). As a core dimension of holistic health, the importance of social health continues to rise with ageing and increasing social estrangement. Combining warm human services with responsible digital technology to build an inclusive, friendly and supportive social-health environment not only improves older persons' quality of life but also reduces medical and long-term-care burden, creating a warmer and healthier ageing society.

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