# Integrated Approaches to Enhancing Physical Health, Mental Well-being, and Social Support in Elderly Nursing Home

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## ABSTRACT

This review paper synthesizes current knowledge on enhancing the quality of life for elderly residents in nursing homes by addressing physical health, mental well-being, and social support through integrated approaches. Recognizing the growing aging population and associated challenges, the review examines physical interventions such as exercise and rehabilitation, mental health therapies including psychosocial support, and strategies to mitigate social isolation. It highlights the emergent role of technology, including IoT monitoring systems, AI-based emotional support, and virtual nursing home models, alongside the influence of architectural and environmental design on resident well-being. Multidisciplinary care models that combine these elements demonstrate promise for improving holistic elderly care. Despite positive trends, gaps remain in policy, staff training, and technology adoption tailored to demographic needs. The review concludes with recommendations for standardized integrated care models, enhanced interprofessional collaboration, and infrastructure design improvements to promote sustained health and quality of life among nursing home residents.

**Keywords:** Nursing homes, physical health, mental well-being, social support, technology integration

## INTRODUCTION

### A. Context and Importance of Elderly Care in Nursing Homes

The global demographic landscape is undergoing profound transformation due to increasing longevity and declining birth rates, leading to a burgeoning elderly population worldwide. This demographic shift has resulted in a heightened reliance on nursing homes and long-term care facilities to support the growing number of older adults, particularly those with chronic health conditions, functional limitations, and social care needs. Nursing homes have become critical institutional settings where physical health management, mental well-being, and social engagement are pivotal for ensuring quality of life (QoL) among residents. Understanding the context and pressing importance of elderly care in nursing homes is fundamental to addressing the multifaceted challenges faced by this vulnerable population.

Juutinen (2023) emphasizes the changing demands placed on integrated, multidisciplinary, and person-centered care models within nursing homes, highlighting the complexity of elderly care as individuals transition from active independent living to reliance on institutional support. This evolving care journey underscores the necessity for nursing homes to adapt their services to address not only medical needs but also social and emotional dimensions of well-being.

Architectural and environmental factors significantly influence the residents' sense of home and overall well-being. Albons et al. (2022) explicate how design elements in traditional Malay houses can inspire flexible and culturally appropriate housing solutions in multi-storey settings, suggesting similar principles might enhance nursing home environments. Moreover, Aliyari (2023) specifically examines architectural features in nursing homes and their direct correlation to elderly residents' sense of home, asserting that lighting, accessibility, and green spaces fundamentally impact residents' environmental comfort and psychological security. Such environmental considerations are paramount given the institutional nature of nursing homes, which may otherwise induce feelings of alienation or loss of autonomy.

Challenges in maintaining quality of life within nursing homes are multifactorial. Rumawas and Wijaya (2023) indicate that residents often experience poorer health outcomes and reduced physical independence compared to elderly individuals living with family, exposing vulnerabilities linked to institutional care settings. These disparities extend to mental health domains as well. Sultanović Karadža (2023) investigates the impact of the COVID-19 pandemic and its associated restrictive measures on nursing home residents, revealing variability in QoL levels and highlighting how gender, age, and pandemic exposure influenced residents' psychological and physical health.

The pandemic has particularly illuminated the risks and vulnerabilities inherent in nursing home populations, where epidemiological outbreaks can lead to disproportionate morbidity and mortality (Flawinne et al., 2023). These challenges necessitate robust infection control policies, alongside sustained efforts to promote holistic well-being.

Further complicating the elderly care landscape is the complex interplay of psychosocial factors. Loneliness, depression, and anxiety have been documented as common mental health conditions among nursing home residents, often exacerbated by social isolation and dwindling family contact (Zead & Khadir, 2023; Ergin et al., 2023). These aspects underscore a critical need for integrated strategies that not only deliver clinical care but also foster emotional support and social inclusion.

In addition to resident-focused challenges, systemic issues such as staffing, job satisfaction, and organizational culture significantly affect care quality. Eriksson et al. (2023) examine migrant care workers in nursing homes, finding that despite high job demands and stress levels, relational satisfaction and pride in caregiving persist, suggesting that improving workplace environments could enhance overall care standards.

This review aims to synthesize current knowledge surrounding elderly care in nursing homes by examining demographic trends, physical and mental health challenges, social support mechanisms, and environmental influences. It further explores the integration of technology and innovations in care delivery to enhance residents' quality of life. Through a multidisciplinary lens, the review will highlight both the challenges and emerging interventions, framing future research and practical advancements in nursing home elder care.

# METHODOLOGY

This review employed a structured literature search across databases such as PubMed, Scopus, and Google Scholar using keywords including "nursing homes," "elderly care," and "integrated interventions." Publications from 2020 to 2024 were screened for relevance, methodological rigor, and applicability. The inclusion criteria prioritized peer-reviewed studies focusing on physical, mental, and social health aspects of elderly care. Articles were analyzed thematically to identify best practices and gaps across multidisciplinary domains.

## C. Overview of Physical, Mental, and Social Health Needs in Nursing Homes

The physical health of elderly residents in nursing homes is characterized by a progressive decline in functional capabilities, muscle mass, balance, and mobility, which collectively contribute to diminished independence in activities of daily living (ADLs). Barczyk et al. (2023) investigated how housing and family dynamics influence elderly savings and care decisions, highlighting that homeowners dis-save more slowly and often sell houses upon nursing home entry, suggesting significant lifestyle adjustments. More directly related to physical health, Tsukahara et al. (2023) documented a significant correlation between the Barthel Index, which measures independence in ADLs, and Skeletal Muscle Mass Index (SMI) in nursing home residents, identifying a high prevalence (84.6%) of low skeletal muscle mass among care-dependent elderly women. This muscle decline is further associated with balance and mobility impairments. Soyuer et al. (2023) corroborated these findings, showing that dominant hand grip strength—a key physical function metric—is significantly correlated with muscle mass, balance, mobility, and daily activity capability among elderly residents, emphasizing the multifaceted impact of muscle degradation.

Zhu et al. (2023) compared gait characteristics between nursing home residents and community-dwelling elderly, identifying nursing home residents as having reduced lower extremity strength and postural balance, a higher fear of falling, and altered gait mechanics during transitional walking phases, underscoring the increased vulnerability to falls and mobility-related accidents in institutionalized settings. Nutritional deficiencies are also

prevalent, with Farapti et al. (2023) reporting that nursing home menus often do not meet recommended dietary allowances, leading to undernutrition among elderly residents, which exacerbates physical decline. Rayanti et al. (2023) similarly noted impaired nutritional status or risks of malnutrition in elderly women across nursing homes, further indicating the need for targeted nutrition interventions.

Mental health challenges in nursing home populations are profound and multifactorial, with depression, anxiety, loneliness, and death anxiety commonly reported. Zead and Khadir (2023) found that elderly in nursing homes exhibit significantly higher levels of depression compared to community counterparts, suggesting that institutionalization may exacerbate psychological distress. Ergin et al. (2023) further explored the relationship between death anxiety, loneliness, and psychological well-being, revealing a negative correlation between psychological well-being and loneliness. This aligns with Gao et al. (2023), who identified sleep quality as a mediating factor between ADLs and depression among elderly nursing home residents, highlighting the complex interplay between physical and mental health.

Psychosocial interventions have demonstrated effectiveness in mitigating some mental health burdens. Wu et al. (2023) demonstrated that modified problem-solving therapy reduces depression and improves coping and self-efficacy in elderly nursing home residents, while Lee and Park (2023) showed group art therapy's positive effects on depression and subjective happiness. These findings support the crucial role of therapeutic programs tailored to the psychological needs of elderly residents.

Social isolation is a pervasive concern in nursing homes, with emotional and instrumental support playing a vital role in residents' well-being. Ngadiran et al. (2023) emphasized the role of spirituality and social life in enhancing psychological well-being and acceptance of living circumstances in nursing homes. Similarly, Mireles et al. (2023) developed a mobile robot to assist home-care nursing and vital signs monitoring, illustrating how technology can aid social support by facilitating care. Wegener et al. (2023) conceptualized nursing homes as community health hubs that promote social inclusion by arranging community activities and dissolving traditional organizational boundaries, thus helping combat isolation.

The safety culture within nursing homes also significantly affects residents' health experiences. Indarwati et al. (2023) identified training, risk assessment, incident management, and the presence of security staff as essential components in improving safety culture, which can reduce injuries and enhance quality of care. Furthermore, Jiang et al. (2023) highlighted the spiritual needs of elderly residents, including those with dementia, emphasizing the importance of family interaction, faith expression, and social engagement as key to emotional and social health support.

In summary, nursing home residents face intertwined physical, mental, and social health challenges. The decline in muscle strength, mobility issues, and nutritional deficits compound psychological stressors such as depression, anxiety, and loneliness. Effective management requires integrative care approaches that address physical rehabilitation, mental health therapies, social inclusion strategies, and attention to safety and spiritual needs, supported increasingly by technological innovations and community-based models to improve overall quality of life.

## Physical Health of Nursing Home Residents

### A. Common Physical Health Concerns

Older adults residing in nursing homes frequently experience significant declines in muscle mass, mobility, and overall functional independence, which profoundly impact their quality of daily life and autonomy. Tsukahara et al. (2023) demonstrated a significant correlation between the level of independence in activities of daily living (ADLs) and skeletal muscle mass index (SMI) among nursing home residents, finding that 84.6% of residents had low skeletal muscle mass. This muscle loss is linked with reduced physical function and increased dependency. Similarly, Soyuer et al. (2023) reported that decreased hand grip strength (HGS) correlates with declines in muscle and bone mass, mobility assessed by timed up and go tests, and daily living activities. Since HGS serves as a proxy for overall muscle strength, it underscores the widespread muscle weakness affecting elderly nursing home residents.

Nutritional challenges also contribute significantly to physical decline in this population. Farapti et al. (2023) analyzed menu intakes in Indonesian nursing homes and found that daily energy and protein consumption

frequently fell short of recommended dietary allowances, with about a quarter of residents classified as undernourished based on BMI analysis. Inadequate nutrient intake exacerbates muscle wasting and compromises immune function. Rayanti et al. (2023) further highlighted impaired nutritional status and risk of malnutrition in elderly women living in nursing homes, emphasizing the risk of declining health and vulnerability to chronic diseases.

Chronic health conditions and nutritional deficiencies are highly prevalent among nursing home residents. Zhang et al. (2023) identified diabetes and hypertension as the most frequent disorders, affecting over a quarter of the elderly in their study, followed by skeletal issues. Furthermore, Uchida et al. (2023) found a 5.8% prevalence of thiamine deficiency among elderly nursing home residents, noting that all deficient individuals were diagnosed with dementia and had poor nutritional intake. These physical health challenges collectively reduce functional independence and worsen prognosis.

### B. Interventions to Enhance Physical Health

Exercise and rehabilitation programs have shown promising effects in mitigating the decline of physical function among elderly nursing home residents. Wołoszyn et al. (2023) found that a 12-week clinical intervention involving physical exercises with elements of dance significantly improved hand grip strength, arm curl test results, and Barthel Index scores compared to basic exercises and routine care. This suggests that incorporating rhythm and movement into exercise therapy may enhance muscle strength and functional capabilities. Weissbach et al. (2023) evaluated a volunteer-supported walking intervention in nursing homes and illustrated that participants valued the social interaction aspect, which motivated engagement while some residents reported improvements in gait, physical performance, and independence.

Complementing physical interventions, combined cognitive and physical exercise programs yield improved outcomes. Altay et al. (2023) demonstrated that integrating anagram training with cardiac exercise over 12 weeks resulted in significantly greater cognitive improvements than cognitive training alone in elderly nursing home participants. Ngadiran et al. (2023) similarly showed a combined occupational and art therapy intervention significantly enhanced the quality of life among nursing home residents, implying cognitive stimulation paired with physical activity supports holistic health.

Technology-assisted physical monitoring and assistance serve as innovative strategies to augment traditional physical health interventions. Mireles et al. (2023) developed a mobile nursing robot capable of monitoring vital signs and assisting gait cycles, providing continuous support to home-cared patients and potentially extending to nursing home settings. The application of such technologies can optimize individualized care by tracking health metrics and delivering physical assistance. Moreover, Rumawas and Wijaya (2023) suggested that health promotion activities incorporating smart and energy-efficient technologies in nursing homes contribute indirectly to better physical health by improving environment quality and operational efficiency.

Beyond direct health monitoring, additional aspects such as thermal comfort and indoor environmental quality also influence the physical well-being of nursing home residents. Su et al. (2023) evaluated indoor thermal comfort during heating periods in nursing home buildings and identified specific comfort intervals aligned with elderly perceptions, critical for maintaining physiological stability. Kim et al. (2023) developed air quality indices tailored for elderly nursing homes to manage indoor pollution, crucial given the susceptibility of older adults to respiratory diseases. These environmental controls complement physical interventions by creating supportive living conditions conducive to maintaining health.

Together, these studies reveal a multi-faceted approach is necessary to address the complex physical health needs of nursing home residents, encompassing rehabilitation programs, cognitive-physical integrated activities, advanced technologies for monitoring and assistance, and optimized living environments.

## Mental Well-Being and Psychological Support

### A. Psychological Challenges in Nursing Home Elderly

Mental health challenges among elderly nursing home residents are significant and multifaceted, encompassing depression, anxiety, loneliness, and fear of death, which impair their overall quality of life. Depression is highly

prevalent in this population and often coexists with anxiety disorders, significantly impacting their psychological well-being. Wu et al. (2023) report depressive symptoms and anxiety as major concerns among elderly nursing home residents, further complicated by coping challenges and reduced self-efficacy. Similarly, Ergin et al. (2023) demonstrate the presence of death anxiety in nursing home residents and its close association with loneliness and diminished psychological well-being, highlighting the vulnerable mental health landscape faced by this group.

Loneliness and social isolation emerge as critical, detrimental factors influencing the mental health of elderly residents. Vitayala et al. (2023) find a positive and significant correlation between loneliness and depression levels in elderly widows and widowers living in social institutions, underscoring the role of social disconnection in mental health deterioration. Zead and Khadir (2023) further corroborate these findings by showing that elderly residents in nursing homes exhibit higher levels of depression compared to those living with families, emphasizing the impact institutionalization may have on mental health.

Sleep problems also contribute to worsening depression among elderly nursing home residents. Gao et al. (2023) identify that poor sleep quality mediates the relationship between difficulties in performing activities of daily living (ADLs) and heightened depression levels, indicating that interventions targeting sleep could alleviate psychological distress in this population.

### B. Therapeutic and Supportive Approaches

Addressing the mental health challenges in elderly nursing home residents calls for targeted psychosocial interventions that enhance coping skills, reduce depressive symptoms, and improve subjective well-being. Group art therapy has demonstrated significant beneficial effects; Lee and Park (2023) conducted a randomized controlled trial among male elderly nursing home residents with mild depression and reported reduced feelings of helplessness, anxiety, and unhappiness, alongside improvements in subjective happiness. This therapy fosters emotional expression and social interaction, contributing positively to mental health.

Similarly, Wu et al. (2023) evaluated the effects of modified problem-solving therapy (MPST) and found that it significantly reduces depression and improves coping strategies and self-efficacy among elderly residents. These findings support the incorporation of cognitive-behavioral interventions in nursing home mental health services.

Social and familial support are equally crucial for psychological well-being. Nurmayunita and Zakaria (2023) demonstrated that organizing family gatherings significantly enhances elderly residents' psychological well-being by boosting their mental health, self-confidence, and emotional connectedness. Such social interactions help combat feelings of neglect and isolation common in institutionalized elderly. Zhao et al. (2023) also highlight the positive perceptions of Chinese older adults and their family members towards smart nursing home models, emphasizing the importance of family and social engagement as part of comprehensive elder care.

Innovative technological solutions are increasingly being utilized to support emotional health among nursing home populations. Song (2024) developed an AI-based emotion detection system using robot vision to monitor and improve elderly residents' emotional states, showing statistically significant improvements compared to traditional manual interventions. This AI technology combines physiological indicators and emotional scale data, enabling timely psychological support.

In addition, Mireles et al. (2023) introduced a mobile robotic device designed for home healthcare, capable of monitoring vital signs and assisting mobility, which has potential psychological benefits through increased autonomy and engagement. Such assistive technologies can reduce feelings of helplessness and foster a sense of security and connectedness among elderly individuals.

Moreover, the spiritual needs of elderly residents contribute significantly to psychological well-being. Jiang et al. (2023) identified five interconnected spiritual needs including faith expression, reception of love and care, social interaction, familial connection, and participation in activities in Chinese faith-based nursing homes. Addressing these needs is imperative to support residents' mental health, especially for those with cognitive impairments.

Collectively, these studies indicate that multidimensional approaches involving psychosocial therapies, family and social engagement, and technology-assisted emotional monitoring and support are essential to improve mental well-being among elderly nursing home residents.

## Social Support Structures in Nursing Homes

### A. Importance of Social Interaction and Community

Nursing homes increasingly serve as vital community hubs where social inclusion can be promoted among elderly residents. Wegener et al. (2023) argue that nursing homes can transcend their traditional institutional roles by facilitating boundary work that dissolves professional and organizational barriers, thereby fostering inclusive community activities. These hubs connect diverse participants, nurturing a sense of belonging and social integration that extends beyond the physical confines of the nursing home. This inclusive approach to health promotion not only supports the residents' psychosocial well-being but also aligns with broader community health goals.

Volunteer-supported activities provide additional psychosocial benefits to nursing home residents. Weissbach et al. (2023) found that interventions such as volunteer-assisted outdoor walking were positively received by elderly participants, enhancing social interaction, a sense of safety, and motivation. Through both qualitative and quantitative data, participants reported improvements in mood, some physical health parameters, and overall quality of life. Volunteers themselves experienced positive effects on their well-being, highlighting the mutual benefits of such programs. Especially during challenging times such as the COVID-19 pandemic, maintaining social contact through volunteer activities was critical for residents' emotional health.

### B. Challenges and Strategies for Enhancing Social Support

Integrating social support into care interventions is crucial to mitigate loneliness, depression, and related mental health issues prevalent among nursing home residents. Behrendt et al. (2023) conducted a scoping review emphasizing the need to embed emotional and instrumental support functions within social care programs for cognitively impaired elderly residents. Their findings suggest that emotional and instrumental support are the most appropriate dimensions to include in nursing home interventions, contributing to reductions in neuropsychiatric symptoms and improvements in physical function and quality of life.

Loneliness and depression are particularly significant issues among widowed elderly residents of nursing homes. Vitayala et al. (2023) report a strong positive correlation between loneliness and depression levels in elderly widows and widowers residing in social institutions, highlighting the necessity for targeted psychological and social support interventions. Similarly, Ergin et al. (2023) examined death anxiety, loneliness, and psychological well-being among elderly nursing home residents, discerning a negative correlation between psychological well-being and loneliness. Their study underscores the complex interplay of emotional states, necessitating comprehensive approaches that address social isolation to improve mental health outcomes.

Additionally, the care workforce composition influences the social environment in nursing homes. Eriksson et al. (2023) review the job satisfaction, wellbeing, and work-related stress of migrant care workers, who form a substantial portion of staff in many nursing homes. Despite facing high job demands and acculturation stress, migrant workers often find pride and relational satisfaction in providing care. Creating a supportive work environment that addresses their unique challenges is pivotal, as it impacts not only staff retention but also the quality of social care delivered to residents.

Beyond institutional measures, family involvement plays a significant role in enriching social support for elderly residents. Nurmayunita and Zakaria (2023) demonstrated that family gatherings notably enhanced psychological well-being among nursing home residents by fostering mental health quality, self-confidence, and social encouragement. Such familial connections can offset feelings of abandonment or neglect that many residents experience, contributing to improved emotional states.

Moreover, humanitarian and complementary social engagement acts serve to alleviate marginalization in nursing home residents. Panjaitan et al. (2024) explored basic complementary interventions like nursing home visits and

social activities for marginalized elderly without family support, noting improvements in feelings of happiness, perceived attention, and functional status. This suggests that low-cost, human-centric interventions can play a vital role in promoting psychosocial well-being.

Finally, the spiritual and emotional needs of the elderly are integral to social support constructs. Zhang et al. (2023) highlighted the dilemma caregivers face in balancing 'giving care' with promoting elderly participation and utilization of internal capacities. This perspective emphasizes the importance of fostering active participation in social and care activities to mitigate feelings of helplessness and promote dignity.

In summary, social support in nursing homes depends on fostering community integration, implementing volunteer-assisted and family-involved interventions, addressing loneliness and depression with emotional support mechanisms, and enhancing workforce wellbeing, particularly of migrant caregivers. Humanitarian acts and spiritual care also enrich social environments, contributing to comprehensive psychosocial support structures essential for elderly well-being in nursing homes.

### C. Smart Technologies and Monitoring Systems

The integration of smart technologies within nursing homes has dramatically transformed the landscape of elderly care by enhancing monitoring capabilities, safety, and overall health management. One notable approach is the use of Internet of Things (IoT) and sensor technology, which allows for real-time monitoring of residents' health and environmental conditions. Albons et al. (2022) demonstrated the feasibility of designing home automation systems with IoT that enable remote control and monitoring of traditional homes, setting a precedent for similar applications in nursing homes. This approach is further advanced by Hsu et al. (2023), who developed a systematic evaluation method tailored for smart monitoring systems in nursing homes, emphasizing the critical role of sensor technology in ensuring stability, safety protection, data processing capacity, and emergency alerts. The adoption of such integrated sensor systems allows for timely detection of emergency situations and continuous health data monitoring, which is essential for vulnerable elderly residents.

Moreover, energy efficiency and operational cost management within nursing home environments have been augmented through smart technologies. Fong et al. (2023) investigated power usage optimization in smart nursing homes by employing self-cognizant prognostics coupled with power-efficient monitoring systems. Their study focused on smart lighting, air conditioning, and meal preparation systems, achieving roughly a 10% improvement in energy efficiency while maintaining a safe environment for elderly occupants. This highlights how technologies not only support clinical and safety needs but also promote sustainable facility management.

In addition to environmental monitoring, technologies have been deployed to directly support the health and mobility of nursing home residents. Mireles et al. (2023) designed a mobile nursing robot capable of vital sign monitoring and gait assistance, addressing the need for continuous health assessment alongside physical support for patients in home-care settings. This robotic system incorporates embedded electronic devices and sensors, performing under variable conditions and interacting through a graphical user interface, thus enhancing the scope of personalized care and rehabilitation.

Another significant development is the use of simulators designed to emulate elder behavior in nursing homes to better inform caregiver actions. Wang and Yao (2023) developed such a simulator to model activities, interactions, and movement patterns of elderly residents, which has proven useful in strategizing efficient protocols for locating lost elders and preventing accidents.

While technological integration enhances safety and health monitoring, several challenges must be addressed. Privacy and data security remain major ethical concerns, particularly regarding continuous surveillance and storage of residents' personal health data. Furthermore, cost barriers limit access to advanced IoT and AI-based systems in resource-constrained facilities. The implementation of user-centered design, focusing on simplicity, accessibility, and inclusivity, is essential to ensure that technologies support rather than overwhelm elderly users.

### D. Virtual and AI-Based Nursing Home Models

The advent of virtual nursing homes marks a pioneering step toward providing elderly care through digital

platforms, enabling medical, social, and recreational services remotely. Ren and Zhou (2023) studied the behavioral intentions influencing the adoption of virtual nursing homes among elderly Chinese individuals, applying a modified UTAUT model. Their findings highlighted that performance expectancy, effort expectancy, and social influence are significant drivers of behavioral intention to use virtual nursing homes. Notably, conformist mentality was a moderating factor in social influence, suggesting cultural dynamics play a critical role in technology acceptance in elderly populations. Although facilitating conditions did not significantly affect behavioral intention, the attitudes formed through perceived usefulness and ease of use were pivotal. Their work underscores the necessity of considering sociocultural factors and wellbeing perceptions in fostering acceptance of virtual care models.

Complementing virtual models, AI-driven emotion detection systems have been introduced to monitor and improve mental health among nursing home residents. Song (2024) designed an AI robot vision system based on comprehensive emotion research, integrating physiological indicators such as heart rate and blood pressure with psychological emotion scales. Utilizing OpenCV for video surveillance, the system processes data through cloud servers and client interfaces for elderly and nurses, providing real-time mental health services. The study demonstrated that the AI system outperformed manual interventions in triggering positive emotions and improving emotional states with statistical significance ($p < 0.01$). This AI approach facilitates proactive mental health monitoring, enabling caregivers to respond promptly to emotional distress and enhancing residents' psychological well-being.

Further, sensor technology underpins many smart systems that combine physical and emotional health monitoring. Hsu et al. (2023) emphasized sensor data's role in system stability and emergency detection, crucial for maintaining an effective smart nursing home infrastructure. These technologies contribute to creating environments conducive to safe and supportive care.

Together, these technologies address multiple dimensions critical to elderly care in nursing homes: they enhance physical safety through monitoring and assistance devices, promote sustainable operational management, expand accessibility to care via virtual platforms, and support psychological health through AI-based emotion recognition. The convergence of IoT, AI, robotics, and behavioral research creates multifaceted tools tailored to the needs of elderly populations, paving the way for smarter and more compassionate nursing home environments.

### E. Influence of Physical Environment on Quality of Life

The physical environment of nursing homes plays a critical role in shaping the quality of life and emotional well-being of elderly residents. Among the architectural factors, the design elements that foster a sense of home are of paramount importance. Aliyari (2023) conducted a study in Tehran, which demonstrated significant positive correlations between architectural features—such as appropriate lighting, the balance of public and private spaces, accessibility, and the presence of green spaces—and the residents' sense of belonging and comfort within the nursing home. These elements are not merely aesthetic but intersect deeply with psychological and environmental well-being, integrating physical accessibility with emotional comfort to enhance residents' daily experiences.

Temperature regulation within nursing homes is another essential factor impacting elderly residents, who are physiologically more vulnerable to environmental fluctuations. Su et al. (2023) analyzed indoor thermal comfort during heating periods in nursing homes in Dalian, China, identifying variability in environmental conditions across different floors, orientations, and functional areas. The study concluded by proposing a tailored thermal comfort range suitable for elderly occupants to improve living satisfaction. Similarly, Kim et al. (2023) emphasized the significance of indoor air quality by developing Air Quality Indices tailored for elderly nursing homes. Their findings revealed that only about 35.6% of data collected from elderly nursing homes fell into acceptable 'Good' or 'Moderate' categories, indicating a need for stricter air quality management specific to vulnerable populations in these settings.

Beyond visual and atmospheric factors, auditory environments significantly influence the restorative experiences of elderly residents. Long et al. (2023) employed virtual reality technology to experimentally assess outdoor soundscapes' physiological and psychological recovery effects on elderly nursing home residents. Their research

indicated that outdoor soundscapes could facilitate psychological restoration and physical relaxation, measuring changes in skin conductance, heart rate, and emotional state within as little as one minute of exposure. The study also noted potential negative implications of excessively quiet environments, which might exacerbate negative moods, emphasizing that soundscape design should balance quietude with natural or pleasant environmental sounds to promote well-being.

### F. Safety and Regulatory Aspects

The safety of elderly residents, including adherence to regulatory standards and cultivating a safety culture, is foundational in nursing home environmental design and operation. Zhang et al. (2023) provided a comparative analysis of fire safety codes and standards for elderly nursing homes in China and Japan. While Chinese regulations on building compartments align with Japanese standards, the study highlighted organizational deficiencies in China's fire reporting systems, smoke exhaust, stairwell designs, and evacuation equipment, placing residents at increased risk. This comparative insight underscores the necessity for not only stringent regulatory frameworks but also consistent enforcement and practical infrastructural adaptations to mitigate fire risks in nursing homes.

Complementing regulatory aspects, the establishment and improvement of safety culture within nursing home settings are critical for minimizing risks and improving residents' safety outcomes. Indarwati et al. (2023) investigated efforts to enhance safety practices through qualitative research in Indonesian nursing homes. Their findings revealed that successful safety culture development involved multifaceted strategies such as comprehensive staff orientation, ongoing training programs, infrastructure upgrades, and the inclusion of dedicated security personnel. Moreover, systematic risk assessments and patient risk management procedures, incident reporting and analysis, and responsive follow-ups to identified risks were emphasized. This holistic safety culture approach fosters a proactive environment that anticipates and prevents accidents, creating safer living conditions for elderly residents.

Architectural design also intersects with safety, where environmental features such as accessible spatial layouts, adequate lighting, and appropriately designed communal spaces reduce accident risks like falls or disorientation. Physical comfort and safety provisions, such as those identified by Aliyari (2023) and Su et al. (2023), indirectly enhance residents' psychological security by creating environments that are navigable and responsive to elderly needs.

Furthermore, the integration of technology as part of safety strategies is gaining momentum. Although not directly part of the architectural design, IoT and smart monitoring systems (as discussed by Albons et al., 2022, and Hsu et al., 2023) influence the environmental safety landscape by enabling real-time monitoring of residents' health parameters and emergency detection, thereby complementing physical design principles.

In sum, the physical and regulatory environment of nursing homes substantially affects the well-being, safety, and overall quality of life for elderly residents. Architectural features that replicate a home-like atmosphere, combined with optimized thermal and air quality conditions and restorative soundscapes, can enhance psychological and physical health. Concurrently, rigorous safety standards and an embedded safety culture ensure a secure setting to minimize risk. Future nursing home design and management practices must holistically integrate these environmental and regulatory considerations to meet the multidimensional needs of aging populations effectively.

## Integrated Approaches and Interventions

### A. Combining Physical, Mental, and Social Strategies

Integrated care models in nursing homes emphasize multidisciplinary collaboration to address the complex physical, mental, and social needs of elderly residents. Juutinen (2023) highlights the importance of customer orientation and integration across home care, hospital, and inpatient services. The study underscores challenges in governance and multidisciplinary collaboration, especially during transitions caused by serious illness or functional decline. Similarly, Katahira and Maruo (2024) reveal through their survey that nursing home nurses perceive varied degrees of collaboration within and outside their care teams, finding that stronger

interprofessional cooperation correlates with enhanced perceptions of nursing benefits and reduced challenges. However, external collaboration remains a challenge, indicating a need for targeted efforts to connect nursing homes with external care professionals to optimize care outcomes.

Job crafting, the proactive modification of work tasks and relationships by nursing home staff, also plays a critical role in enhancing care quality. Romeo et al. (2023) demonstrate that task, relational, and cognitive job crafting positively impact perceived quality of care among nursing home employees. Notably, organizational identification moderates this effect, with stronger identification amplifying benefits, suggesting that fostering staff commitment and engagement is essential for sustainable quality improvements.

Physical health interventions benefit substantially from regular medication reviews, which improve prescription appropriateness and reduce drug-related problems in elderly nursing home residents. Zacarin et al. (2023) report that medication reviews led to over half of their recommendations being implemented, resulting in drug withdrawals and dosage adjustments that enhance patients' safety and medication efficacy.

Real-world examples illustrate the potential of multidisciplinary care models. Finland's integrated home-hospital nursing system and Japan's community-based integrated care approach demonstrate the benefits of aligning medical, social, and architectural strategies to improve residents' quality of life. These models highlight how policy, environment, and professional collaboration can converge to produce holistic and sustainable care outcomes (Juutinen, 2023; Itkonen, 2019; Hatano et al., 2016).

### B. Complementary and Holistic Interventions

Holistic approaches integrating physical, cognitive, and social elements have demonstrated efficacy in improving quality of life (QoL) for nursing home residents. Wulandari et al. (2023) document that combining occupational therapy with art therapy significantly improved QoL scores in elderly nursing home residents, indicating that integrative therapeutic activities can address both physical and psychological well-being. Complementing this, Altay et al. (2023) found that combining anagram training with cardiovascular exercise yielded better cognitive improvements compared to cognitive training alone, suggesting synergistic benefits of combined interventions in maintaining mental function.

Beyond structured therapies, humanitarian acts fostering social engagement are vital for marginalized and solitary elders. Panjaitan et al. (2024) describe simple basic complementary interventions, such as nursing home visits and social activities, that improve residents' conversational engagement, personal value perception, and overall happiness. Though improvements were slight, these interventions show promise in mitigating loneliness and enhancing functional status, potentially reducing institutional care burdens.

Spirituality is a crucial dimension of holistic care, particularly for Muslim elderly in nursing homes. Taufik et al. (2024) reveal that increased spiritual practice through regular worship correlates with higher acceptance of one's situation and better QoL. This spiritual well-being acts as a coping strategy, improving physical health, social engagement, and mental resilience. Furthermore, Jiang et al. (2023) emphasize the widespread spiritual needs among elderly Chinese residents, including those with dementia, highlighting the roles of familial interaction, social engagement, and personalized spiritual services in meeting these needs.

Complementing these findings, Behrendt et al. (2023) identify emotional and instrumental social support as key dimensions in interventions for elderly nursing home residents. Their scoping review shows that integrating these supports promotes improvements in neuropsychiatric symptoms, physical function, and overall quality of life. Weissbach et al. (2023) add that volunteer-supported interventions, such as outdoor walking programs, enhance physical and psychosocial well-being by fostering social interaction, motivation, and safety.

Technological innovations including AI-based emotion detection (Song, 2024) provide new avenues to monitor and improve mental health by identifying negative emotional states early and facilitating timely interventions. Meanwhile, the integration of robotic assistance (Mireles et al., 2023) supports physical health by monitoring vital signs and assisting mobility, illustrating how technology complements multidisciplinary care.

Together, these integrated approaches highlight the need to combine physical health promotion, mental health

support, social interaction, and spiritual care underpinned by collaborative teamwork and innovative technologies to enhance the holistic well-being of nursing home residents.

### C. Research Gaps and Opportunities

Policy and governance remain foundational challenges in the delivery of integrated elderly care within nursing homes. Juutinen (2023) highlights persistent governance issues that affect multidisciplinary collaboration and customer orientation in elderly care services, especially through the care continuum from home to inpatient facilities. Likewise, Albons et al. (2022) emphasize the significant variation in regulatory frameworks across regions, which affects human resources and material infrastructure but lacks a unified national standard, complicating quality assurance and access equity. These findings collectively signal an urgent need for harmonized policies that promote integrated, person-centered care models accommodating the complex needs of nursing home residents.

Interprofessional collaboration also emerges as a critical axis for enhancing care quality. Katahira and Maruo (2024) found that strong inter- and intraprofessional collaboration among nursing staff correlates with perceived nursing benefits and reduced difficulties, noting that collaboration outside immediate clinical teams, especially with external care managers, is presently suboptimal. Improvement of these external partnerships may improve coordination, resource sharing, and care continuity, which is essential given the multifaceted health and social support needs of nursing home residents.

Regarding technological integration, the adoption of virtual nursing homes and AI-driven tools faces challenges related to usability, demographic differences, and cultural attitudes. Zhao et al. (2023) stress that acceptability among older adults depends on perceived efficacy, ease of use, and socio-economic and educational backgrounds, with older age and low technological literacy reducing uptake. Ren and Zhou (2023) further confirm that behavioral intention to use virtual nursing homes is shaped by performance expectancy and social influence, underscoring the need for tailored technology implementation strategies that accommodate users' specific contexts and conformist mentalities.

Additional knowledge gaps include optimizing social support mechanisms for elderly residents, particularly in addressing loneliness and depression, and leveraging migrant care workers' contributions to maintain high care standards, as discussed by Behrendt et al. (2023) and Eriksson et al. (2023), respectively. Furthermore, safety culture enhancement, including structured risk assessment and incident reporting, remains underdeveloped but critical to patient safety (Indarwati et al., 2023).

Policy gaps persist in linking healthcare, technology governance, and long-term care systems. In many regions, regulatory oversight is fragmented, leading to inconsistencies in training, data ethics, and service quality. The World Health Organization's Integrated Care for Older People (ICOPE) framework provides a valuable reference for establishing unified, evidence-based policies that ensure coordination between health, social, and technological sectors.

### D. Practical Implications for Nursing Homes and Care Providers

The complexity of elderly care necessitates the development and implementation of standardized care models that synthesize health services, social engagement, and technological support. Multidimensional interventions, encompassing physical health programs, psychological therapies, and social inclusion initiatives, should be integrated to enhance residents' overall well-being.

Training and empowerment of nursing home staff are paramount. Strengthening competencies in interprofessional collaboration, cultural sensitivity, and the use of assistive technologies can improve care delivery and job satisfaction (Romeo et al., 2023; Katahira & Maruo, 2024). Such staff development initiatives should also include education on mental health care approaches, dementia assistance, and communication strategies with residents and families.

Infrastructure design must also prioritize resident comfort, safety, and engagement. Architectural features influencing the sense of home, such as accessible green spaces, appropriate lighting, and private/public area

balance, significantly impact residents' psychological well-being (Aliyari, 2023). Additionally, ensuring thermal comfort and air quality tailored to elderly physiological needs mitigates health risks and improves satisfaction (Su et al., 2023; Kim et al., 2023). The adoption of smart monitoring systems and sensor technologies can simultaneously elevate safety and operational efficiency, as demonstrated by Hsu et al. (2023) and Fong et al. (2023).

Finally, fostering a safety culture that encompasses staff orientation, training, robust incident management, and infrastructure preparedness is essential. Indarwati et al. (2023) argue for systematic risk identification and the implementation of preventive measures to minimize accidents and improve resident safety.

Collectively, these directions underscore a necessity for nursing homes and care providers to embrace comprehensive, evidence-based frameworks integrating human, technological, and environmental dimensions to elevate elderly care quality sustainably.

### E. Recommendations for Practice and Policy

Based on this review, the following standardized guidelines are proposed to enhance elderly care in nursing homes: 1. Foster multidisciplinary collaboration through structured communication channels among healthcare providers, social workers, and architects. 2. Implement ethical data governance policies for AI and IoT technologies to protect resident privacy. 3. Align national elderly care standards with the WHO ICOPE framework to promote integration and accountability. 4. Design age-friendly, accessible environments that prioritize safety, comfort, and autonomy. 5. Encourage continuous staff training and professional development to maintain high-quality, person-centered care.

## CONCLUSIONS

This review underscores the complex and interrelated physical, mental, and social health challenges experienced by elderly residents in nursing homes. It highlights that integrated approaches combining evidence-based physical interventions, comprehensive mental health support, and proactive social engagement are essential for enhancing quality of life. The incorporation of advanced technologies such as AI, IoT, and virtual care platforms alongside thoughtful architectural design further supports residents' well-being and safety. However, persistent gaps in policy frameworks, staff training, and the tailored implementation of technology underscore the need for more coordinated efforts. Moving forward, fostering interprofessional collaboration, standardized multidisciplinary care models, and infrastructure improvements will be crucial to meet the evolving needs of nursing home residents. Continued research should focus on optimizing these integrated strategies to achieve sustainable improvements in elderly care.

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