

Research On Design for The Elderly-Friendly Space

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Abstract. The elderly care service project is a pivotal and far-reaching initiative that underpins the long-term development of a nation. Within this framework, the design of aging-friendly spaces assumes a crucial role, bridging social security measures, medical resource allocation, and the quality of life for the elderly. As living standards continue to rise, so too does the elderly population's expectation for comfort and variety in their care spaces. Nevertheless, current aging-friendly space designs tend to lag behind, often adhering to outdated design concepts and homogenous layouts, thereby compromising their functionality and adversely affecting the living environment and quality for the elderly. Therefore, drawing upon diverse data from the National Bureau of Statistics of China, the Ministry of Health, Labour and Welfare of Japan, and relevant manuals, we intend to undertake a study on aging-friendly space design, focusing on the physiological and psychological needs of the elderly. Our objective is to minimize the risk of accidents in their daily home activities and elevate their quality of life.

Keywords: Population aging; Age-friendly design; Activity space for the elderly.

1. Introduction

In the backdrop of swift progressions in contemporary social sciences, information technology, and medical science, there has been a marked improvement in the quality of life, leading to a substantial rise in average life expectancy. China is progressively transitioning into the "Silver Age" epoch. Despite the expanding array of comprehensive elderly care models in China, encompassing scientific, varied, and tailored options, empirical data from the "China Statistical Yearbook" underscores the preference of 90% of the elderly for home-based care. While Chinese academics have demonstrated profound interest in exploring elderly living environments, the current research landscape tends to be broad and lacks precision in catering to the specific requirements of this demographic. Therefore, this study aims to embark on an in-depth exploration of the overarching needs of the elderly population, serving as a foundational starting point for further investigations.

2. Principles of Age-Friendly Space Design

2.1. Principles for Residential Space Design

In designing spaces for elderly home care, it is essential to deeply understand the actual needs of the elderly population. This involves ensuring that the physical layout and configuration of the space support their daily activities, while also considering their behavioral habits and emotional needs to create a living environment that is both functional and enjoyable. When selecting a location, a peaceful and scenic area, especially one rich in greenery, is preferable, as it provides both physical and mental health benefits to the elderly.

Contrary to the privacy sought by younger individuals, the elderly tend to prioritize safety and comfort in bedroom selection. Therefore, during the design process, we must adhere to ergonomic principles, carefully planning the bedroom space and arranging furniture in a way that aligns with the physical characteristics and usage habits of the elderly. This approach ensures a practical, yet cozy living space tailored to their needs. In essence, the design of elderly bedrooms should adhere to the

principles of functionality, comfort, safety, and harmony with nature, creating an ideal space for them to enjoy their later years.

2.2. Safety Principle

In prioritizing the safety of elderly activities, comprehensive security monitoring for indoor and outdoor spaces is crucial. Deploying all-around cameras and advanced alert systems ensures that professional teams can effectively monitor the elderly's status and promptly respond with timely assistance in case of emergencies. Special attention should be given to the elderly who rely on wheelchairs for daily mobility, requiring the planning of spaces that cater to the operational needs of wheelchairs and stretchers. This necessitates reserving ample space for wheelchair maneuverability, smooth operation for caregivers, and safe flow for personnel. Even in private spaces like bedrooms, the rotation radius of wheelchairs and operational space for caregivers must be considered, ensuring that the elderly can enjoy daily life in a comfortable and safe environment. This design approach aims to enhance the quality of life for the elderly, ensuring they live securely and happily at home.

Central to enhancing the safety of elderly activities, indoor and outdoor spaces require strengthened security measures. We will deploy comprehensive cameras and alert systems, enabling office teams to observe the elderly's activities precisely and respond rapidly with assistance in emergencies. Given that many elderly rely on wheelchairs for daily movement, space planning and design must accommodate wheelchair and stretcher usage. This includes ample space for wheelchair maneuverability, convenient operation for caregivers, and smooth flow for personnel, ensuring no spatial constraints or obstructions. Similarly, in private areas like bedrooms, we consider the wheelchair rotation radius and caregiver operational space, creating a comfortable and safe living environment for the elderly. This design enhances their quality of life, providing comprehensive safety assurance.

2.3. Principle of Comfort

When planning elderly-friendly spaces, comfort takes precedence and is closely aligned with age-friendly design concepts. In the design of bedrooms for the elderly, ventilation and lighting are paramount. To achieve an ideal sleeping environment, bed placement is carefully considered to ensure proper airflow circulation with windows and doors. Additionally, considering the sensitivity of the elderly to intense sunlight, we recommend using adjustable lighting materials and finishes, such as ventilated and light-regulating blinds, to ensure they enjoy natural light while avoiding discomfort.

Architecturally, we strive to reduce the potential oppressive feeling of living spaces through the artful combination of forms, colors, and greenery. The introduction of natural elements like plants and landscapes not only creates a serene and warm atmosphere but also strengthens the connection between humans and nature, further enhancing the comfort and happiness of elderly residents. This design approach not only demonstrates a thoughtful care for the physiological needs of the elderly but also offers them profound respect and nurturing on a psychological level.

2.4. Principle of Flexibility

The spatial configuration and dimensions of bedrooms should provide flexibility in furniture arrangement to cater to the needs of the elderly, who prefer to rearrange furniture according to seasons or personal preferences for a more comfortable bedroom ambiance. Additionally, bedrooms should have dual functionality, encompassing social aspects that allow the elderly to welcome guests while also providing suitable spaces for learning or personal pursuits.

When designing bedrooms for the elderly, flexibility in spatial configuration and dimensions should be thoroughly considered to accommodate their diverse needs. The elderly tend to adjust furniture placement based on personal preferences or seasonal changes to create a cozier resting environment. To meet their social needs within the bedroom, we should ensure it serves dual purposes: as a private space for relaxation and as a venue for hosting guests, studying, or engaging in personal pursuits. This design not only enhances the bedroom's practicality but also increases its versatility

and flexibility, fulfilling the elderly's actual needs and enabling them to enjoy a more vibrant social and leisurely life at home.

2.5. Functional Principle

Indoor spaces should be carefully delineated to distinguish between dynamic and static areas. While maintaining connectivity, these areas should be distinct enough to prevent interference, allowing residents to engage in activities based on their preferences and moods. This autonomy significantly impacts the mental health of the elderly. The main activity area in the living room should be strategically positioned near windows, enabling the elderly to enjoy natural light and outdoor scenery. Integrating features like floor-to-ceiling windows or balconies creates a comprehensive and inviting space.

When planning indoor spaces, it is essential to emphasize the functional division of areas, especially the differentiation between dynamic and static zones. This division not only maintains spatial order and functionality but also creates a comfortable environment that caters to residents' diverse needs. For the elderly, such a design greatly enhances their mental well-being. Dynamic zones should be designed as open and vibrant, accommodating entertainment facilities, fitness equipment, or event spaces for socializing and engaging activities. Static zones, on the other hand, should maintain tranquility and privacy, such as reading, resting, or meditation areas, providing suitable spaces for the elderly when they need solitude.

While maintaining connectivity between the two zones, it's crucial to distinguish them through rational layout and design elements. For instance, different floor materials, wall colors, or furniture arrangements can create visual separations, preventing interference while allowing residents to freely choose activity areas based on their preferences. As the heart of the home, the living room's design should especially cater to the elderly. Positioning the main activity area near windows maximizes natural light, creating a bright and cozy space. Meanwhile, the outdoor view brings joy and relaxation. Integrating floor-to-ceiling windows or balconies further broadens the horizon, bringing the elderly closer to nature. To reduce design redundancy, introduce unique elements in each area. In dynamic zones, modern decorative materials and furniture create an energetic atmosphere. While in static zones, cozy fabrics and soft furnishings foster a serene ambiance. Additionally, seasonal or holiday decorations add interest and freshness. In summary, indoor space planning should consider the elderly's needs and preferences, creating a practical and comfortable environment through rational layout and distinctive elements. Emphasizing design diversity and innovation reduces redundancy, making each space uniquely charming and personalized.

3. Activity Space Design for General Elderly Populations

3.1. Activity Space Design

Due to the natural decline in physical functions associated with aging, the sleep quality of the elderly population tends to be more vulnerable to external disturbances. Consequently, many seniors prefer a secluded and serene resting environment, isolated from other elderly individuals. When designing bedrooms for those requiring specialized care, specific considerations should be given to the placement of the bed. To facilitate efficient caregiving and bed maintenance by nursing staff, the bed should be positioned with three accessible sides, ensuring unobstructed access. Furthermore, the bed should be situated at an appropriate distance from windows to mitigate the risk of direct exposure to cold air currents and minimize potential health hazards. Additionally, the bed should be positioned in a manner that avoids direct alignment with the door to reduce the likelihood of nighttime disturbances stemming from external persons or noise.

Beyond the design of single bedrooms, we must also consider the potential loneliness issues faced by some elderly individuals and provide suitable double bedrooms accordingly. In double bedrooms, the layout of the beds should prioritize the privacy needs of both elderly residents, which can be achieved through the installation of bed curtains. Furthermore, to ensure unobstructed mobility,

sufficient space of at least 900mm should be maintained between the two beds, allowing elderly individuals to move freely.

3.2. Leisure and Entertainment Space Design for the Elderly

Due to their comparatively constrained physical mobility, numerous elderly individuals often engage in various leisure and entertainment activities within their bedrooms, encompassing television viewing, radio listening, and reading. To safeguard their visual health, it is imperative to select a television screen with optimal ergonomic properties for the elderly. Furthermore, given that seniors frequently watch television from their beds, adhering to the guidelines specified in the "Urban Home Aging-Friendly Renovation Guidebook" ensures that the bedroom's clear width reaches approximately 3.7 meters, thereby maintaining a suitable distance between the elderly's eyes and the television screen.

Moreover, the window-adjacent area is also a preferred locale for the elderly to unwind. We advise arranging comfortable seating in this vicinity, enabling them to leisurely consume a cup of tea, bask in natural sunlight, engage in conversational exchanges with friends, or utilize audio-visual equipment. This spatial design not only maximizes the utilization of natural light but also provides the elderly with a wider array of options for leisure and entertainment pursuits.

3.3. Bathroom Design

Bathrooms are spaces where the elderly population is prone to accidents, thus emphasizing safety, convenience, and comfort in the design process is crucial. Firstly, from a safety perspective, the bathroom should be functionally divided into an entrance area, a washbasin area, a toilet area, and a shower area. To facilitate the entry and exit of wheelchair users, the bathroom entrance should avoid any ground level differences and maintain a clear width of no less than 850mm. Simultaneously, to ensure that the door can be smoothly opened in emergency situations, an outward-opening door design should be adopted, and the door handle should be easy to grasp and installed at a height convenient for wheelchair users.

In the washbasin area, the design of the sink should focus on practicality and convenience. Sufficient countertop space should be provided for the placement of items. Considering the needs of wheelchair users, the clearance height beneath the sink should be greater than 680mm to ensure comfortable access for wheelchair users' legs.

The design of the toilet area should take into full account the special needs of the elderly population. At least 650mm of clearance should be maintained around the toilet to facilitate movement and the use of grab bars. Smart toilets are more suitable for the elderly due to their convenience, and their installation position should be close to the wall to assist the elderly with grab bars. The grab bars should be made of warm and moderate thickness materials that meet various support needs, such as L-shaped grab bars, which can be used for both support and leverage during standing. In toilet areas without a wall design, an elderly-friendly leaning frame should be installed for the convenience of the elderly.

In the shower area, it is recommended to use soft curtain partitions instead of glass products to ensure privacy, ventilation, and ease of access, while also facilitating rescue by staff in emergency situations. For the shower area, stainless steel shower trays are recommended instead of traditional water barriers to achieve a level floor. Additionally, movable stools at the same height as wheelchairs or folding wall stools should be provided for the elderly to use. The "L" shaped grab bars installed on the wall should be horizontally arranged to support the elderly's movement changes during bathing.

4. Conclusion

Through careful planning, every design element, from environmental configuration to flow optimization, and incorporation of daily life details, aims to create a residence that is both secure and filled with life's pleasures. Such a design not only effectively mitigates potential risks but also

significantly enhances the quality of life for the elderly, enabling them to enjoy a serene later life in familiar surroundings.

Looking ahead, with the rapid advancement of technology and the continuous improvement of people's living standards, home-based elderly care space design will face new opportunities and challenges. We need to continually innovate and refine our design thinking to ensure that every detail precisely meets the needs of the elderly. Additionally, we eagerly anticipate the involvement of more professionals and societal forces to contribute to the happiness and well-being of the elderly.

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