

Design Strategies for an Intergenerational Community Center for the Elderly and Children: A Behavioral Architecture Approach

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Abstract

Demographic shifts in Indonesia indicate a steady increase in the elderly population, accompanied by elevated risks of cognitive impairment and dementia, while children are increasingly exposed to psychological stress and behavioral instability associated with excessive smartphone use, social isolation, and limited after-school supervision. These parallel challenges call for spatial interventions that extend beyond functional provision toward environments capable of supporting cognitive orientation, emotional regulation, and social interaction across age groups. Intergenerational community centers represent a critical platform for addressing these issues through the application of behavioral architecture integrated with universal design principles. Spatial strategies emphasizing layered zoning, clear wayfinding, and carefully managed environmental stimuli contribute to dementia-sensitive settings for older adults while simultaneously offering engaging physical and social alternatives that reduce children's dependence on digital devices. Shared yet differentiated spaces enable intergenerational presence and passive interaction without compromising safety, privacy, or autonomy.

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1. Introduction

Demographic changes in Indonesia show an increasing number of elderly people, coupled with a persistently high proportion of children, particularly in urban and peri-urban areas (Central Statistics Agency [BPS], 2024; United Nations, 2023). Elderly people are increasingly vulnerable to cognitive decline and dementia, while children face the risk of psychological stress, social isolation, and dependence on digital devices due to limited spaces for quality physical interaction (UNICEF, 2022; World Health Organization [WHO], 2023).

In the Patumbak area of Deli Serdang Regency, the limited availability of inclusive community facilities reinforces the segregation of social activities based on age (BPS Deli Serdang Regency, 2024). Elderly people experience decreased social participation due to limited mobility, while children often spend time after school unsupervised and with high levels of exposure to devices, further diminishing opportunities for intergenerational interaction (BPS, 2024; UNICEF, 2022).

The behavioral architecture approach views the built environment as an active factor that shapes behavior, cognitive orientation, and social interactions through spatial arrangements and environmental stimuli (Lang, 1987; Zeisel, 2006). The integration of universal design principles allows for the creation of intergenerational community centers that are adaptive for the elderly while also safe and stimulating for children (Steinfeld & Maisel, 2012). However, contextual architectural studies in Indonesia that formulate intergenerational design strategies based on behavioral architecture are still limited, so the development of a data-driven and applicable design framework is needed.

2. Literature Review

2.1. Behavioral Architecture and the Built Environment

Behavioral architecture views the built environment as an active system that shapes movement patterns, social interactions, and emotional responses of users through spatial configuration, clarity of circulation, scale, and sensory qualities [5]. Space is not neutral, but rather plays a role in guiding certain behavioral tendencies, including the intensity and quality of social interactions. In community facilities, the legibility of space and the visual relationships between areas determine whether interactions occur naturally or are hindered.

This approach is relevant for seniors and children, who are highly sensitive to environmental stimuli. Seniors require consistent and easily understood spatial structures, while children require spaces that safely facilitate physical activity and exploration. Thus, behavioral architecture provides a conceptual framework for designing community spaces that positively shape intergenerational behavior.

2.2. Dementia Sensitive Environments

Cognitive decline in older adults is often exacerbated by environments that are complex, full of visual distractions, and have poor circulation. These conditions can trigger disorientation, anxiety, and social withdrawal. Conversely, environments with simple spatial structures, consistent visual landmarks, and natural lighting support cognitive orientation and a sense of security [6].

Public health approaches also prioritize environmental quality as part of non-medical interventions to maintain the quality of life of older adults with dementia [3]. Therefore, community spaces for older adults need to be designed to support routines, orientation, and social participation, rather than simply serve as passive gathering spaces.

2.3. Children, Social Isolation, and the Physical Environment

When safe and engaging public spaces are unavailable, children tend to shift their play and social activities to digital devices. This impacts emotional regulation, concentration, and social skills [2]. Built environments that provide active and supervised play spaces act as a protective factor against stress and digital dependency.

Community spaces designed to suit children's needs, with a variety of activities and social connectedness, enable children to develop empathy, cooperation, and emotional control through direct interaction. Thus, the physical environment serves as a medium for shaping children's social behavior.

2.4. Appropriate Site Development

Intergenerational interactions provide reciprocal benefits, with older adults gaining cognitive stimulation and a sense of meaning, while children gain emotional support and social learning [7]. However, these interactions are strongly influenced by spatial structure. Age segregated spaces reinforce social distance, while spaces with transition zones and high visibility allow for naturally occurring encounters.

Universal design principles ensure that intergenerational spaces can be used safely and dignifiedly by all age groups without physical or symbolic segregation [8]. These principles encompass accessibility, legibility, flexibility of use, and psychological safety.

3. Method

This research applies a qualitative-descriptive approach based on behavioral architecture to formulate a design strategy for an intergenerational community center for seniors and children. The methodology focuses on understanding the interrelationships between user

behavior, demographic and health conditions, and the role of the built environment as a medium for non medical interventions that shape cognitive orientation, emotional regulation, and social interaction.

The methodological process is structured in stages, starting with the collection of demographic and health data, through user behavior analysis, and finally, the synthesis of architectural design strategies. This approach does not aim to produce a final physical design, but rather to create a strategic framework that can be adaptively applied to the context of the community center.

Table 1 Behavioral Architecture based Research Methodology Framework

Focus of Analysis	Data Sources and Types	Analysis Process	Output
Age structure and social vulnerability	Population data, health statistics, local social reports	Mapping the proportion of elderly and children and related social conditions	Community center user profile
The risk of dementia in the elderly and psychological stress in children	Public health data, behavioral studies of children and the elderly	Interpretation of the relationship between health conditions and the physical environment	Space based identification of non medical needs
User activity and interaction patterns	Behavioral architecture literature and contextual observation	Mapping the relationship between behavior space environmental stimuli	User behavior parameters
Spatial needs across ages	Synthesis of universal design theory and behavioral architecture	Translating behavioral needs into design indicators	Architectural design criteria
Integration of space, program, and stimulus	Previous analysis results	Preparation of zoning principles, circulation, and space programs	Conceptual design strategy
Alignment with intergenerational goals	The resulting design framework	Assessment of strategy consistency on health and behavioral issues	Applicative design framework

4. Result and Discussion

In the design strategy, there are 3 locations selected for consideration. A comparison of three alternative locations reveals significant variations in accessibility, environmental comfort, open space availability, and land use suitability. Locations in residential zones with quieter neighborhood scales demonstrate greater potential for supporting cognitive orientation for the elderly and child safety, compared to locations in city-scale commercial

corridors with higher traffic and noise intensity. This aligns with behavioral architecture principles that emphasize spatial legibility, environmental consistency, and minimal overstimulation for vulnerable users.

Table 2 Alternative Location Comparison

Analysis Criteria	Alternative Location 1	Alternative Location 2	Alternative Location 3
Zone Characteristics	Trade & Services	City scale trade	Residential
Site area	±2.58 ha	±3.2 ha	±3.0 ha
Accessibility	Good, heavy traffic	Very good, city artery	Good, neighborhood scale
Social environment	Dominant commercial activity	Intensive activity	High citizen interaction
Noise level	Medium–high	High	Low–moderate
Availability of open space	Limited	Limited	High
Land contour & condition	Relatively flat	Relatively flat	Relatively flat
Suitability for elderly behavior	Medium	Low	High
Suitability for children's behavior	Medium	Low–moderate	High
Category	Moderately suitable	Suitable	Very suitable

The comparison results indicate that locations with the highest suitability scores have an advantage in creating environments that support adaptive behavior, both for the elderly and children. Medium-intensity residential environments allow for the creation of transitional spaces, natural surveillance, and the integration of daily community activities, which are important in reducing social isolation for the elderly and stress for children due to limited play space [11]. Thus, these results strengthen the argument that intergenerational community center design strategies must begin with site selection that aligns with behavioral and health goals, rather than solely based on economic considerations or land availability.

Table 3 Cross Table Mapping

Site Analysis Findings	Behavioral Implications	Design Strategy Users	Principles of Behavioral Architecture
Low to moderate residential zones	Elderly people orient themselves more easily, children feel safe	Placement of primary functions in quiet zones	Reduction of excessive stimuli
Low to moderate noise levels (±45–65 dB)	Psychological stress is reduced	Acoustic zoning and green buffers	Emotional regulation

Neighborhood scale accessibility	Elderly mobility is more controlled	Simple and loop internal circulation	Readability of space
High availability of open space	Potential for physical & social activity	Intergenerational open space	Social behavior activation
The land contour is relatively flat	Safe access for all ages	Barrier free and ramped path	Universal design
Existing community interaction	Natural social support	Integration of semi public spaces	Natural surveillance
Distance from city arteries	Minimal visual and auditory distractions	Inward building orientation	Therapeutic environment
Human environmental scale	Sensory comfort	Low building mass	Perception of safety
Proximity to residential areas	Children not isolated after school	Community based after school programs	Stress prevention
High site suitability	Optimal behavioral support	Priority development location	Behavior space compatibility

This cross mapping demonstrates that the intergenerational community center's design strategy stems directly from site characteristics and user behavior findings. The location, with its relatively quiet residential neighborhood and ample open space, allows for multilevel zoning, intuitive circulation, and visible intergenerational spaces. This strategy aligns with behavioral architecture principles that position the environment as a guide for cognitive orientation, emotional regulation, and social interaction, particularly for vulnerable age groups such as the elderly and children.

Table 4 Synthesis of Results and Discussion Based on Behavioral Architecture

Analysis Aspects	Key Findings	Architectural Response	Behavioral Impact
Condition of the elderly	Decreased cognitive orientation	Simple spatial layout	Increased sense of security
Child's condition	Stress and gadget addiction	Active play space	Emotional regulation
Different needs	Contrast space character	Gradual zoning	Minimal conflict
Age interaction	Minimal shared space	Intergenerational zone	Social cohesion
The role of architecture	Environment shapes behavior	Behavioral architecture	Preventive interventions

The analysis shows that differences in behavioral and spatial needs between older adults and children can be bridged through a behavioral architecture approach integrated with universal design principles. The design strategy serves as a non-medical intervention that supports cognitive orientation, emotional regulation, and social interaction across generations.

5. Conclusion

Intergenerational community centers have the potential to serve as effective non-medical interventions in addressing cognitive decline in the elderly, as well as psychological stress and device dependency in children. A behavioral architecture approach combined with universal design principles enables the built environment to play an active role in shaping cognitive orientation, emotional regulation, and social interaction patterns across age groups through spatial organization, circulation, and environmental stimuli.

The formulated design strategy emphasizes the importance of gradual zoning, spatial legibility, and the provision of intergenerational spaces as a means of bridging differences in behavioral needs without compromising safety and comfort. Conceptually, this design framework expands architecture's contribution to the development of inclusive and sustainable community facilities and can serve as a reference for community center design practices in urban and peri-urban contexts.

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