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A Relational Architectural Model for Health-Oriented Housing

Alicja Maciejko

University of Zielona Góra, Institute of Architecture and Urban Planning, Prof. Szafrana 1 Str., 65-515 Zielona Góra, Poland

ABSTRACT

This paper proposes Relational Healing Housing (RHH) as a conceptual architectural research model integrating environmental health, relational configuration, and regenerative spatial principles within residential design. Drawing on salutogenic theory, environmental psychology, biophilic research, and evidence-informed healthcare design, the model translates therapeutic spatial logics from institutional settings into housing and settlement structures. The elementary 35 m^2 unit is defined as a spatial threshold supporting autonomy, internal zoning, and cognitive stability, while allowing aggregation for caregiving and multi-generational arrangements. At the settlement scale, a circular configuration of houses is organized through layered spatial gradients, including a rain-garden canal buffer, a service ring, and a minimally programmed central open space. The model synthesizes literature-based indicators and empirical survey findings, including preferences for spatial autonomy, access to greenery, and cohabitation with animals. Positioned as a pre-implementation research instrument, RHH enables structured spatial analysis and comparative evaluation at the conceptual design stage. The study contributes an adaptable archetype for health-oriented communal housing in contemporary urban contexts.

Keywords: Salutogenic design, Research by design, Wellbeing indicators, Spatial autonomy, Evidence-based design, Biophilic design, Environmental psychology, Healing environments, Social sustainability, Neuroarchitecture

INTRODUCTION

Contemporary housing is increasingly entangled with health, yet architectural discourse still treats dwelling primarily as a functional or economic category. The COVID-19 pandemic revealed the home as a critical extension of healthcare infrastructure, a site of telemedicine, isolation, recovery and long-term monitoring (WHO, 2018). At the same time, demographic ageing, the rise of chronic diseases and the growth of single-person households have transformed the spatial and social demands placed on residential architecture.

While healthcare architecture has developed sophisticated frameworks through Evidence-Based Design (Ulrich, 1984; Ulrich, 2003), salutogenic theory (Golembiewski, 2022; Dilani, 2009) and universal design (Steinfeld & Maisel, 2012), their integration into everyday housing remains limited. Residential design rarely synthesizes insights from environmental psychology (Evans, 2003), biophilia (Kellert & Wilson, 1993), neuroarchitecture

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(Higuera-Trujillo et al., 2021) or contemporary dimensional studies (Appolloni & D'Alessandro, 2021; Ulrich, 2025) into a coherent architectural model.

Recent research indicates that spatial thresholds below 30 m² per person correlate with increased stress and reduced wellbeing, whereas approximately 30–35 m² may constitute a minimum autonomous spatial condition supporting psychological stability and human flourishing (Ulrich, 2025). Yet housing standards continue to oscillate between economic minimums and market-driven surplus, rarely engaging spatial autonomy as an architectural and existential category.

Parallel to this, cohousing models (Jarvis, 2011) and alternative mass-housing strategies (Habraken, 2021; Brand, 1995) have explored flexibility and community integration, but without systematically addressing the spatial translation of health stages, from prevention to rehabilitation and long-term maintenance. Recovery housing research (Vilsaint et al., 2025) further confirms the importance of spatial autonomy combined with structured communal support.

This article proposes an architectural archetype termed Relational Healing Housing, a research-by-design model that integrates health-supportive spatial principles, minimum autonomous dwelling thresholds (35 m² elementary unit), and a ring-based relational urban structure organized around a central open space - an intentionally unprogrammed spatial field free from functional saturation.

The aim is not to present a finalized design solution, but to formulate a transferable architectural structure capable of deformation, adaptation and scaling. The proposed model operates simultaneously at the scale of the dwelling unit and the collective settlement, positioning housing as an active spatial medium in the continuum between prevention, treatment and social reintegration.

CONCEPTUAL AND SYSTEMIC FRAMEWORK

Research on health-oriented environments has largely evolved within institutional settings, particularly hospitals, through Evidence-Based Design and salutogenic approaches (Dilani, 2009; Golembiewski, 2022). At the same time, public health frameworks confirm the strong association between housing conditions and health outcomes (World Health Organization, 2018), while environmental psychology demonstrates the correlation between spatial density, perceived crowding, and stress-related responses (Evans, 2003; Lorentzen et al., 2022). Comparative European studies further reveal inconsistencies in dimensional housing standards and limited integration of well-being metrics into spatial thresholds (Appolloni & D'Alessandro, 2021). Recent work on minimum spatial housing requirements identifies approximately 30–35 m² as a threshold associated with autonomy and reduced spatial stress (Ulrich, 2025). Despite these findings, a coherent architectural model that integrates environmental health, relational configuration, and regenerative spatial conditions at the scale of housing and settlement remains insufficiently articulated.

Table 1: Evolution of spatial–health paradigms and their architectural implications.

Period	Concept	Core Principle	Architectural Implication
Pre-modern	Traditional spatial doctrines (e.g., Feng Shui)	Harmony between human and environment	Spatial balance, orientation, symbolic center
1940s	Ergonomics	Physiological fit between body and space	Dimensioning based on human scale
1960s	Environmental psychology	Space affects mental health	Stress-reducing spatial organization
1970s	Affordance theory	Environment offers action possibilities	Clear spatial cues, usability
1970–80s	Snoezelen / multisensory design	Sensory modulation supports wellbeing	Controlled lighting, textures, sound
1980s	Healing architecture	Environment supports recovery	Patient-centered spatial layouts
1980s	Universal design	Accessibility for diverse users	Barrier-free circulation
1990s	Biophilia	Innate human-nature connection	Courtyards, vegetation, daylight
1990s	Neuroarchitecture	Brain–space interaction	Emotional regulation through form
1990s	Biomimicry	Learning from nature	Passive environmental strategies
1990s	Evidence-Based Design	Decisions based on research	Measurable design parameters
1990s	Therapeutic landscapes	Landscape as healing medium	Integration of green infrastructure
2000s	Salutogenesis	Environment as health resource	Sense of coherence in layout
2014	WELL Building Standard	Performance-based health metrics	Indoor air, light, comfort standards

This table synthesizes the chronological development of key concepts, from environmental psychology and universal design to biophilia, neuroarchitecture, salutogenesis and WELL standards, highlighting their spatial principles and implications for residential environments. Rather than serving as a historical overview, the table functions as a condensed theoretical matrix informing the Relational Healing Housing model.

Existing models address therapeutic environments primarily within healthcare facilities or recovery housing contexts (Vilsaint et al., 2025). Cohousing research emphasizes shared infrastructures and community interaction (Jarvis, 2011), while universal design focuses on accessibility and inclusivity (Steinfeld & Maisel, 2012). Biophilic and neuroarchitectural studies demonstrate the measurable cognitive and physiological effects of spatial exposure to nature (Kellert & Wilson, 1993; Higuera-Trujillo et al., 2021), and classical EBD research confirms the impact of views and daylight

on recovery outcomes (Ulrich, 1984). However, these strands remain fragmented. An integrative residential archetype capable of systematically connecting spatial autonomy, environmental health indicators, relational gradation, and regenerative sensory conditions within a single architectural framework is still lacking.

This paper proposes Relational Healing Housing (RHH) as a conceptual architectural model developed within a research-by-design framework. Health is approached as a relational condition emerging from the interaction between environmental performance, social configuration, and sensory-regenerative qualities of space. These domains are treated as equally weighted components of a systemic structure rather than as hierarchical layers.

The elementary unit of the model is a 35 m² modular dwelling, defined as a spatial threshold enabling autonomy while allowing aggregation into larger configurations. Empirical studies associate units below approximately 30 m² with increased stress and reduced residential satisfaction (Ulrich, 2025; Evans, 2003). Comparative analyses of European standards confirm variability in dimensional criteria but reinforce the importance of spatial adequacy for psychological well-being (Appolloni & D'Alessandro, 2021). The 35 m² configuration enables internal zoning, private sanitary facilities, independent food preparation, and accommodation for temporary caregiving presence. A minimum 14 m² sleeping zone and increased ceiling height (2.7–3.0 m) are treated as performance parameters supporting prolonged occupancy and reduced sensory compression.

The model integrates access to daylight and views toward greenery as restorative variables, consistent with established findings on stress reduction and recovery acceleration (Ulrich, 1984). Survey data conducted as part of this research further indicate a strong preference for the possibility of cohabitation with animals. Literature on human–animal interaction confirms measurable psychophysiological effects, including stress modulation and emotional stabilization (Beetz et al., 2012). The presence of companion or assistance animals is therefore incorporated as a regenerative component within the relational domain.

Table 2: Contemporary systemic conditions justifying the healing housing model.

Systemic Condition	Key Challenge	Architectural Implication
Continuation of hospital treatment at home	Housing not adapted to therapy	Integration of medical-ready private spaces
Telemedicine and monitoring technologies	Increased role of home as care infrastructure	Digital-health infrastructure embedded in housing
Ageing population and chronic diseases	Long-term home-based management	Universal design + adaptable spatial layout
Environmental overstimulation and stress	Mental fatigue and sensory overload	Buffer zones, acoustic protection, biophilic elements
Changing household structures	Single-person units, remote work	Flexible 35 m² modular units
Social isolation	Reduced community interaction	Regulated relational common spaces

This table presents the set of environmental, relational and regenerative indicators derived from literature review, public health guidelines and the authors' empirical survey. It functions as an operational framework connecting theoretical constructs with architectural variables.

At the urban scale, the model organizes eight to ten community houses composed of twelve to eighteen units each in a circular configuration. A pedestrian promenade separates the residential ring from the service ring, while the central open space remains minimally programmed. This spatial void functions as a low-stimulation cognitive refuge, supporting restoration and reducing sensory overload (Pallasmaa, 2012).

The outer ring accommodates services such as urban farming, workshops, co-working spaces, kindergarten facilities, cafés, and an idea pavilion. These ground-level services are accessible both from the internal settlement and from the surrounding city, ensuring permeability rather than enclosure. The spatial logic draws from cohousing research (Jarvis, 2011), adaptable housing systems (Habraken, 2021), typological thinking (Caniggia & Maffei, 2001), and the notion of buildings as evolving systems (Brand, 1995).

Table 3: Health stages and spatial translation in residential design.

Health Stage	Spatial Requirement	Model Translation
Primary prevention	Access to light, ventilation, movement	Biophilic courtyard, walkable inner ring
Early detection	Monitoring capability	Telehealth-ready private units
Treatment	Controlled private environment	Zoned 35 m² unit (entry–living–rest)
Rehabilitation	Gradual social reintegration	Shared therapy rooms, gardens
Long-term maintenance	Physical activity and social contact	Calisthenics spaces, communal kitchen

This table translates the theoretical framework into a layered settlement diagram, identifying the residential ring, buffer zones, rain-garden canal, service ring, and central open space as interacting spatial strata. It serves as a bridge between conceptual theory and the design model that will be further tested.

Relational Healing Housing is presented as a conceptual research model intended for iterative testing. The model synthesizes literature-based indicators, empirical survey data, and spatial prototyping within a research-by-design methodology. Multi-criteria evaluation methods may support future operationalization (Saaty, 2008), although the present study focuses on establishing the architectural framework and its theoretical coherence.

RESEARCH DESIGN AND METHODOLOGY

The study adopts a research-by-design methodology, in which architectural modeling functions as an analytical instrument rather than solely as a representational outcome. Within this framework, spatial configuration is treated as a hypothesis-testing medium, allowing the integration of environmental health indicators, relational structures, and regenerative spatial parameters into a coherent system (Brand, 1995; Habraken, 2021).

The Relational Healing Housing (RHH) model is therefore not presented as a finalized typology but as a conceptual research prototype designed for iterative testing and refinement. The model is constructed through the synthesis of three categories of data: 1/ Literature-derived indicators such as public health guidelines, environmental psychology, neuroarchitectural research, and salutogenic theory provide measurable and semi-measurable variables related to density, daylight, acoustic comfort, access to nature, autonomy, and cognitive restoration (WHO, 2018; Evans, 2003; Higuera-Trujillo et al., 2021; Golembiewski, 2022). 2/ Dimensional thresholds: comparative housing standards and recent research on minimum spatial requirements inform the selection of 35 m² as the elementary unit threshold associated with autonomy and reduced spatial stress (Appolloni & D'Alessandro, 2021; Ulrich, 2025). 3/ Empirical survey data. An original survey conducted by the author examined user perceptions of therapeutic domestic environments. The results indicated high importance assigned to: spatial autonomy within shared systems, access to greenery, presence of communal yet optional interaction zones, possibility of cohabitation with animals. The latter finding aligns with research demonstrating psychophysiological benefits of human–animal interaction (Beetz et al., 2012).

The research process followed three analytical steps: First, extraction of spatial principles from theoretical paradigms (Table 1). Second, clustering of well-being indicators into environmental, relational, and regenerative domains (Table 2). Third, translation of these clusters into a spatial archetype at two scales: the 35 m² elementary unit and the circular settlement structure (Table 3). The circular settlement is treated as a neutral geometric archetype allowing future deformation according to site conditions, while maintaining internal relational logic.

Although multi-criteria decision-making methods offer potential tools for weighting environmental and relational variables (Saaty, 2008), this study prioritizes architectural system coherence over quantitative optimization. The model is positioned as a pre-implementation research instrument that enables structured spatial analysis and comparative evaluation at the conceptual design stage.

MODEL DESCRIPTION: SPATIAL AND PROGRAMMATIC CONFIGURATION

The elementary unit constitutes the smallest autonomous spatial module within the Relational Healing Housing framework. Its 35 m² area is defined as a threshold of spatial adequacy enabling autonomy, internal zoning, and cognitive stability (Ulrich, 2025; Evans, 2003). The unit is organized in three spatial gradients: a transitional entry zone functioning as a hygienic and psychological buffer; a living-social zone allowing daily activity and limited visitation; and a protected sleeping zone of minimum 14 m² ensuring acoustic separation and prolonged rest conditions. The unit includes an independent kitchenette and private bathroom, allowing withdrawal without social dependency. Ceiling height (2.7–3.0 m), daylight access, and visual contact with greenery are treated as integral performance parameters rather than

optional features, supporting stress reduction and sensory regulation (Ulrich, 1984; Kellert & Wilson, 1993). The unit is designed for single occupancy but allows aggregation into double or triple modules for multi-generational or caregiving arrangements. This aggregation does not eliminate autonomy; instead, it maintains relational proximity without enforced dependence. Each community house consists of 12–18 elementary units organized around shared ground-level functions. These shared spaces include a physiotherapy room, a sensory regulation room, a vertical garden zone, and a small medical consultation space. The inclusion of such facilities translates selected hospital-grade healing principles into domestic scale without transforming the settlement into an institutional structure. The ground floor operates as a semi-public layer for residents and invited users, while upper floors maintain residential privacy. Spatial buffers between units are intentionally designed to generate incidental interaction without forcing social exposure, consistent with research on gradated community structures in cohousing models (Jarvis, 2011). The house operates as a micro-collective: small enough to maintain familiarity, large enough to sustain shared infrastructure. The configuration enables specialization, houses may adapt to elderly residents, persons in recovery, families with caregiving responsibilities, or mixed-health communities, without segregating groups spatially.

The resulting spatial configuration is defined not by a fixed aesthetic form, but by a rigorous relational logic developed through iterative prototyping. In this framework, the architectural outcome is expressed as a system of interdependent spatial strata, where the theoretical indicators from Table 3 are translated into a sequence of functional and sensory zones. The model operates as a flexible archetype, prioritizing the structural hierarchy of health-oriented gradients over a static typological representation.

At the settlement scale, eight to ten community houses are arranged in a circular configuration. The geometry functions as an archetypal diagram rather than a rigid form; it allows deformation according to site conditions while preserving relational logic. Between the residential ring and the central open space runs a pedestrian promenade. Circulation does not cut through the center, preserving the spatial integrity of the inner zone. The ring structure produces legibility, containment, and equal proximity among houses, reinforcing spatial coherence and orientation. The circular arrangement recalls theoretical models of the "ideal city" while translating them into a contemporary relational housing framework. Unlike defensive or hierarchical historical precedents, this configuration operates through gradation rather than exclusion.

The central space is intentionally minimally programmed. It may contain a single tree, water element, stone structure, or open sand field, but avoids functional saturation. The clearing acts as a low-stimulation spatial anchor and collective visual horizon. From a neuroarchitectural perspective, reduction of sensory complexity and preservation of open perceptual fields support cognitive restoration and emotional regulation (Higuera-Trujillo et al., 2021; Pallasmaa, 2012). In the model, the clearing serves as a shared contemplative void rather than a programmed plaza, reinforcing the balance between activity and withdrawal.

Encircling the residential ring is a rain-garden canal functioning simultaneously as water management infrastructure and spatial buffer. The canal moderates microclimate, increases humidity during heat periods, and supports biodiversity. It also introduces a threshold between residential intimacy and public life. Bridges connect residential houses to the outer service ring. The service ring includes cafés, urban farming facilities, co-working spaces, small-scale retail, kindergarten, and an "idea pavilion" dedicated to cultural and artistic production. Ground-level services are accessible both from within the settlement and from the surrounding city, preventing the formation of a gated enclave. This dual-access structure ensures permeability while maintaining gradated spatial transitions. The service ring operates as a protective yet porous layer—spatially buffering the inner settlement from urban traffic while inviting exchange and participation.

Vehicular access, deliveries, and underground parking are located along the external perimeter. Selected community houses integrate underground parking that connects to segmental shelter infrastructure, ensuring safety without visible fortification. The settlement therefore balances openness and resilience. It does not rely on fencing or defensive enclosure; instead, it employs layered spatial gradients: public urban edge → service ring → canal buffer → residential ring → central open space. This layered configuration translates the theoretical framework into spatial structure. Environmental health, relational proximity, and regenerative calm are not treated as separate strategies but as interdependent strata within a coherent urban micro-system.

DISCUSSION

The Relational Healing Housing model addresses a gap between health-oriented architectural theory and residential practice. While evidence-based design, salutogenic frameworks, and biophilic research have generated substantial knowledge on healthcare environments, their systematic translation into housing typologies remains limited (Dilani, 2009; Golembiewski, 2022; Ulrich, 1984). The model integrates these strands into a coherent spatial archetype operating at both dwelling and settlement scales.

The 35 m² elementary unit responds to documented thresholds of spatial stress and autonomy (Ulrich, 2025; Evans, 2003), reframing minimum housing not as a regulatory requirement but as a condition for psychological stability and restorative capacity. By embedding zoning, daylight exposure, and sanitary independence within the smallest module, autonomy becomes a primary health determinant rather than a secondary amenity.

At the settlement scale, the circular configuration and layered gradients establish a structured relational environment without enclosure. The rain-garden canal, service ring, and central open space function as environmental, social, and cognitive regulators. This system offers an alternative to gated enclaves and fragmented housing, proposing a permeable yet buffered configuration. Semi-shared therapeutic functions at ground level extend selected healthcare principles into the domestic realm, supporting recovery and preventive well-being without institutionalization.

The inclusion of animal cohabitation, supported by survey findings and literature on human–animal interaction (Beetz et al., 2012), expands the

regenerative domain beyond conventional environmental variables, reflecting the recognition of multispecies domesticity within contemporary well-being discourse.

The model also responds to demographic ageing, caregiving burdens, and lessons from the COVID-19 pandemic, which exposed the vulnerability of housing systems unable to support prolonged occupancy, remote care, and psychological resilience. By treating housing as distributed support infrastructure rather than mere shelter, residential architecture is reframed as a preventive health environment. The study's limitation lies in its conceptual nature: the model functions as a pre-implementation research instrument enabling structured spatial analysis at the conceptual stage. Empirical validation through simulation, post-occupancy evaluation, or pilot implementation remains a necessary direction for future research. The indicator set underpinning these decisions will be made explicit and operationalised through a hierarchical decision framework in a subsequent study.

CONCLUSION

This study proposes Relational Healing Housing as a conceptual architectural model integrating environmental health, relational configuration, and regenerative spatial principles within a unified residential framework. The research demonstrates that a 35 m² elementary unit can operate as a threshold of spatial autonomy supporting cognitive stability, sensory regulation, and caregiving flexibility when embedded within a structured communal system. The circular settlement archetype translates theoretical constructs—salutogenesis, biophilia, universal design, and evidence-informed healing—into a layered spatial configuration that balances openness, buffering, and social gradation.

By incorporating animal cohabitation and semi-shared therapeutic infrastructure, the model expands the understanding of domestic environments as active contributors to well-being rather than passive containers of life. The study contributes to architectural research by offering a transferable spatial archetype that can be adapted to diverse urban contexts and tested through research-by-design methodologies. Further investigations should focus on indicator-based simulation, environmental performance assessment, and comparative evaluation across socio-cultural settings.

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