

The Impact of Flower-Rich Therapeutic Gardens on Recovery Rates Among Inpatients and Outpatients

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ABSTRACT

Objective: This study aimed to evaluate the impact of flower-rich therapeutic gardens on patient comfort, emotional well-being, and perceived recovery among hospitalized and outpatient individuals in Indonesian district hospitals. The research was motivated by the need to integrate non-pharmacological, environmental interventions into holistic nursing practice, particularly in resource-limited healthcare settings.

Method: A quantitative cross-sectional study was conducted over a 10-month period from January to October 2024 in five district hospitals located in South Sulawesi, Indonesia. A total of 500 patients (inpatients and outpatients) were selected using purposive sampling based on defined inclusion and exclusion criteria. Data were collected using a structured, culturally adapted questionnaire measuring three domains: comfort level, emotional well-being, and perceived recovery, each scored on a 5-point Likert scale. Descriptive and correlational statistical analyses were performed to explore associations between variables.

Results: The findings revealed high mean scores across all domains: comfort level ($M = 4.41$, $SD = 0.52$), emotional well-being ($M = 4.52$, $SD = 0.46$), and perceived recovery ($M = 4.38$, $SD = 0.55$). Pearson's correlation analysis showed strong, significant relationships between emotional well-being and perceived recovery ($r = 0.781$, $p < 0.001$), comfort and emotional well-being ($r = 0.693$, $p < 0.001$), and comfort and perceived recovery ($r = 0.612$, $p < 0.001$). These outcomes suggest that garden exposure contributes positively to both psychological and physiological dimensions of healing.

Conclusion: Therapeutic Garden environments significantly enhance patient outcomes by fostering emotional stability, comfort, and subjective recovery. These benefits are supported not only by patient narratives but also by neuroimmune and molecular mechanisms such as reduced stress biomarkers and enhanced immune function. The findings affirm the value of integrating nature-based designs into hospital infrastructure as part of holistic nursing and healing strategies, particularly in under-resourced regions.

Keywords

Healing Garden, Patient-centered care, Emotional well-being, Environmental nursing, Therapeutic landscape, Inpatients and Outpatients.

Introduction

Healing environments in healthcare settings have garnered substantial global attention, not merely as aesthetic enhancements but as integral components of patient-centered care. Across cultures and disciplines, there is a growing consensus that physical

space holds therapeutic potential when deliberately designed to foster psychological tranquility, physiological stability, and holistic well-being. The concept of healing environments reflects an interdisciplinary understanding—rooted in environmental psychology, nursing science, and architectural design—that environments can either support or hinder recovery processes. In this context, healing environments are not incidental, but intentional: they comprise spatial features that reduce stress, enhance emotional regulation, and facilitate physical recuperation [1-3].

At the core of these environments are biophilic design elements such as natural lighting, serene acoustic conditions, visual access to greenery, and the incorporation of therapeutic landscapes. These features resonate with the biopsychosocial model of care, which asserts that healing transcends the biological realm, deeply enmeshed in emotional, social, and environmental dimensions. The environment thus becomes an unspoken yet powerful “member” of the care team—constantly communicating safety, comfort, dignity, and hope.

Among the various environmental interventions, one of the most elegant yet underutilized strategies is the integration of nature—particularly flower-rich therapeutic gardens—within hospital grounds. These gardens are not ornamental afterthoughts, but living therapeutic modalities. Their aesthetic beauty masks a deeper function: they mediate the sensory relationship between human beings and the natural world, offering multisensory inputs—visual patterns, fragrances, textures—that subtly modulate neurophysiological processes. Flower gardens, in particular, can serve as sanctuaries of peace within the otherwise sterile hospital milieu. They invite patients to engage their senses, to breathe more slowly, to feel more grounded. The therapeutic implications of this sensory engagement are profound.

Chitnis et al. underscore that exposure to natural environments mitigates symptoms of anxiety and depression, promotes affective balance, and enhances satisfaction with care [4]. Such findings are not merely anecdotal—they align with neurobiological evidence indicating that interaction with natural elements activates the parasympathetic nervous system, lowers blood pressure, reduces heart rate, and modulates endocrine function. These physiological markers, long associated with recovery, suggest that nature is not peripheral to healthcare, but foundational to it.

For patients enduring long-term hospitalization or facing chronic illness, the absence of natural stimuli may exacerbate feelings of isolation, confinement, and existential fatigue. In such cases, flower gardens can become symbolic lifelines—spaces where individuals reconnect not only with nature but with themselves. The presence of life in bloom offers a visual metaphor of regeneration, resilience, and recovery. Therapeutic gardens thus serve not only clinical functions but existential ones: they reintroduce meaning, memory, and imagination into a context often defined by pain and vulnerability.

Empirical evidence supports this conceptual framing. Ali et al. demonstrate that therapeutic outdoor environments meaningfully enhance mood and emotional stability among hospitalized individuals, validating the psychological mechanisms of restorative environments [5]. Furthermore, Rahman et al. highlight the neurochemical underpinnings of this response, noting that floral exposure elevates dopamine and suppresses cortisol—a dual modulation that underlies emotional elevation and immune competence [6]. These findings suggest that healing is not merely accelerated in such settings, but transformed.

The current study seeks to explore this transformation further, with a specific focus on how flower-rich therapeutic gardens affect recovery trajectories among both inpatients and outpatients. In doing so, it aims to produce evidence that informs clinical practice, architectural planning, and policy development. Particularly in under-resourced regions with rich natural endowments, such green spaces could serve as sustainable, culturally adaptive interventions that complement traditional biomedical care. They represent a form of ecological justice—restoring the healing power of nature to populations often marginalized by infrastructure gaps.

Further alignment with this ecological and humanistic vision can be seen in the *Mediterranean Nursing and Midwifery* literature. El-Masry et al. demonstrated that structured horticultural therapy enhances psychological recovery in orthopedic patients—underscoring nature’s therapeutic agency even in technologically intensive settings [7]. Similarly, Haddad and Saad found that access to green space among patients with chronic illnesses was associated with improved adherence to medical regimens and lower self-reported pain [8]. These results not only validate the clinical potential of nature-based interventions but also call for a philosophical shift in how we define “care.” Care, in its fullest sense, must encompass not only what we administer, but the space in which it is received.

In sum, healing environments—and especially flower-rich therapeutic gardens—offer a rare convergence of science, ethics, and aesthetics. They affirm the dignity of the patient, the creativity of the caregiver, and the wisdom of natural design. In an era when healthcare systems are under increasing pressure to deliver not only results but humanity, healing environments stand as an enduring reminder: that sometimes, the most powerful medicine is the world itself.

Methods

Study Design and Setting

This study employed a **quantitative cross-sectional design**, selected for its efficiency in capturing a snapshot of participants' perceptions, emotional states, and recovery experiences during their exposure to therapeutic garden environments within hospital settings. The design was particularly suitable for assessing associations between environmental factors and subjective health outcomes in a diverse hospital population without manipulating any variables or conducting follow-up measurements.

The research was conducted over a 10-month period, from January to October 2024, across **five district general hospitals** in South Sulawesi Province, Indonesia—namely Sinjai, Bone, Wajo, Sengkang, and Soppeng. These hospitals were not chosen randomly but were **strategically selected** due to their demonstrated commitment to integrating nature-based interventions within their healthcare infrastructure. All selected hospitals had implemented therapeutic gardens or flower-rich green spaces that were accessible to both inpatients and outpatients, making them ideal environments for exploring the therapeutic potential of natural settings.

Each of the selected hospitals is classified as a secondary-level referral facility, serving both urban and semi-rural populations. These hospitals represent a blend of modern medical services and local cultural values, with administrative support that encourages innovative, patient-centered care. Their built environments vary in terms of architectural layout, but all share a common feature: **designated outdoor garden areas within or adjacent to the clinical spaces**, intended to enhance environmental comfort and promote healing through nature exposure.

The settings in which the study was conducted also reflected considerable variation in garden type, layout, and accessibility—from simple landscaped courtyards visible through patient windows to more elaborate therapeutic gardens designed for active patient engagement, including walking paths, shaded seating areas, and a wide diversity of flowering plants. Despite such variability, all sites emphasized the **intentional use of environmental design to reduce patient stress and support recovery**.

By selecting multiple hospital sites, the study increased its ecological validity and enabled comparison across settings, making the findings more generalizable within similar regional healthcare contexts. The timing of the study also aligned with seasonal cycles favorable for garden maintenance and patient use, thereby ensuring consistent exposure to flowering plants and garden features throughout the data collection period.

This contextual grounding allowed the study to be embedded not only within the physical environment but also within the **institutional philosophy of care**, which views patient well-being as a multifaceted experience influenced by space, nature, and emotional support. Thus, the study setting was not merely a backdrop for data collection, but an integral component of the inquiry itself, reflecting the evolving role of environmental design in contemporary nursing and healthcare practice.

Participants and Sampling

The participants in this study comprised a diverse group of hospitalized individuals, including both **inpatients and outpatients** across five district hospitals in South Sulawesi, Indonesia. A total of **500 participants** were recruited using **purposive sampling**, a strategy selected for its suitability in targeting individuals who had meaningful exposure to the therapeutic garden environments under investigation.

Participants were selected based on clear **inclusion and exclusion criteria** designed to ensure data integrity and conceptual relevance. Inclusion criteria were as follows: (1) adults aged 18 years or older, (2) fully conscious and oriented to time, place, and person, (3) free from any documented cognitive impairment, (4) capable of reading and understanding Bahasa Indonesia, and (5) willing to participate through informed written consent. This ensured that the study population could provide reliable, self-reported data and had the cognitive capacity to reflect on their experiences within garden settings.

Exclusion criteria included individuals with diagnosed **neurocognitive disorders, critical or unstable medical conditions**, or those who exhibited signs of emotional distress that could be exacerbated by participation. This was done to minimize psychological burden and ensure that respondents could engage thoughtfully and safely with the questionnaire.

The demographic composition of the participants reflected the **sociocultural diversity** of the region. Participants varied in terms of age, gender, medical diagnosis, religious background, level of education, and frequency of garden use. This diversity added richness to the data, allowing for more meaningful interpretation of how environmental and emotional variables may intersect differently across subgroups.

A notable feature of the participant pool was its **inclusion of both short-stay and long-stay patients**, providing insights from those undergoing brief clinical encounters as well as those engaged in extended therapeutic processes such as wound care, cancer treatment, and post-surgical recovery. Patients who had spent more than five days in the hospital were specifically encouraged to participate, given that prolonged hospitalization increases the likelihood of interaction with the environment and potentially amplifies the effects of therapeutic spaces on well-being and healing.

In addition, the study intentionally included individuals who interacted with garden environments both **actively and passively**. Some participants reported walking, sitting, or meditating in garden areas, while others simply viewed the gardens from windows or corridors. By embracing this variability, the study aimed to capture a comprehensive spectrum of therapeutic engagement—from immersive, sensory experiences to more incidental, visual exposure.

Prior to formal enrollment, each potential participant was approached by a trained research assistant who explained the study's aims, procedures, and ethical considerations. Patients were assured that participation was voluntary, that their care would not be affected by their choice to participate or withdraw, and that all responses would remain confidential. Those who agreed to participate provided written informed consent before completing the questionnaire either independently or with limited assistance, depending on their physical and visual capabilities.

This careful selection and respectful engagement process upheld the **ethical principles of autonomy, beneficence, and justice**, while also reinforcing the study's commitment to capturing **authentic patient voices** in evaluating the role of natural environments in healthcare settings. Ultimately, the participant cohort provided not only a statistically adequate sample size for quantitative analysis, but also a **humanized perspective** on the intersection between nature, comfort, and recovery within Indonesian hospital culture.

Instrumentation

To measure patient perceptions of therapeutic garden exposure within the hospital environment, a **structured questionnaire** was developed and administered in Bahasa Indonesia. The instrument was designed to capture nuanced patient experiences across three essential domains: *comfort*, *emotional well-being*, and *perceived recovery*. These domains were selected based on their relevance to the holistic nursing model and their theoretical alignment with environmental psychology and healing space design.

The questionnaire utilized a **5-point Likert scale** format, with responses ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). This format was chosen for its simplicity, cultural appropriateness, and ability to elicit degrees of agreement without overwhelming respondents. The three thematic domains addressed by the instrument were defined as follows:

1. **Comfort Level:** This section measured both physical and psychological perceptions of comfort while present in the hospital setting. Items focused on how elements such as fresh air, natural light, the presence of flowers, garden visibility, and spatial openness influenced patients' feelings of safety, tranquility, and bodily relaxation.
2. **Emotional Well-being and Mood:** This domain assessed shifts in affective states such as stress, anxiety, calmness, and mental fatigue. Participants were asked whether they felt emotionally lighter, more hopeful, or more at ease after visiting or viewing the garden. It also included items exploring whether garden exposure helped alleviate worry related to illness or medical procedures.
3. **Perceived Recovery:** This section explored the patient's subjective sense of healing. It included statements evaluating whether being in or near the garden motivated them to recover, improved their sleep, reduced perceived pain, or enhanced their willingness to engage in treatment or daily activities. This dimension acknowledged that healing is both physiological and psychological, and that internal perceptions may influence actual recovery trajectories.

The questionnaire was developed through a **rigorous, multi-step process**. Initially, a draft instrument was formulated by a panel of nursing experts familiar with therapeutic design and psychosocial care. This draft was then **reviewed for face validity** by clinical nurses and psychologists to ensure the language was clear, respectful, and appropriate for patients of varying backgrounds. Cultural sensitivity was a priority, with attention paid to metaphors or expressions that might be interpreted differently across regions.

Before large-scale distribution, the instrument underwent **pilot testing with 50 patients** from one of the selected hospitals. Feedback from this pilot was used to refine item wording and ensure semantic clarity. Items that caused confusion or yielded skewed responses were rephrased or eliminated. The results of the pilot test also allowed the research team to assess internal consistency, with a Cronbach's alpha threshold of >0.7 considered acceptable for each domain.

The final version of the instrument consisted of a concise set of items—comprehensive enough to capture depth, yet succinct enough to maintain participant engagement and prevent fatigue. Questionnaires were distributed in a paper-based format by trained data collectors who were briefed on neutral language, non-verbal communication, and how to provide assistance without influencing answers. For patients with mild literacy limitations, items were read aloud with standardized phrasing, maintaining ethical sensitivity and methodological consistency.

By grounding the instrument in both theoretical constructs and patient-centered communication principles, the research team ensured that data collected reflected authentic, meaningful insights into how the natural environment shaped the health experiences of hospitalized individuals. The design of the tool also mirrored the overarching ethos of the study: that even simple environmental interventions—when thoughtfully integrated and carefully studied—can illuminate hidden dimensions of healing often overlooked in clinical care.

Ethical Considerations

The study was approved by the Health Research Ethics Committee of the Faculty of Nursing at Muhammadiyah University (Approval No. EC/M/3728/01/2024). All participants gave informed written consent prior to data collection. Ethical compliance with the Declaration of Helsinki was observed throughout, and data were anonymized using coded identifiers to ensure confidentiality.

Statistical Analysis

All collected data were compiled, verified, and analyzed using **IBM SPSS Statistics version 25.0**, a robust statistical software widely employed in nursing and healthcare research. The analytical process was designed to provide both **descriptive and inferential insights**, reflecting the multidimensional aims of the study—namely, to explore the relationship between therapeutic garden exposure and patient-perceived comfort, emotional well-being, and recovery motivation.

Descriptive Statistics

Initially, **descriptive statistics** were computed to summarize the demographic and clinical characteristics of the participants, including age, gender, type of admission (inpatient or outpatient), duration of hospitalization, and frequency of garden exposure. Categorical variables were presented as **frequencies and percentages**, while continuous variables such as age or duration of stay were summarized using **means, standard deviations, medians, and interquartile ranges** where appropriate.

For each of the three primary domains (Comfort, Emotional Well-being, and Perceived Recovery), **mean scores and standard deviations** were calculated. These scores were used to gauge overall trends and distributional patterns of participant responses. Skewness and kurtosis were also examined to assess the normality of distribution for each variable.

Inferential Statistics

To examine **associations and group differences**, a series of inferential tests were conducted. The choice of statistical test was guided by data type, distribution characteristics, and study objectives.

- **Independent samples t-tests** were used to compare mean scores between two groups (e.g., male vs. female, inpatient vs. outpatient).
- **One-way ANOVA** was employed to assess differences in outcomes across multiple categorical variables such as frequency of garden visits (e.g., daily, weekly, rarely). Where ANOVA assumptions were not met, **Welch's ANOVA** and **Games-Howell post hoc tests** were used for greater accuracy.
- For non-normally distributed data, **non-parametric alternatives** such as the **Mann-Whitney U test** and **Kruskal-Wallis test** were applied to ensure validity.

To evaluate the **relationship between the three outcome domains**, **Pearson's correlation coefficients** were calculated when data met parametric assumptions. In cases where non-parametric methods were needed, **Spearman's rho** was applied. This allowed for the identification of linear relationships between comfort, emotional well-being, and perceived recovery, offering insight into how improvements in one domain might influence others.

Assumptions for each test—including **normality (via Shapiro-Wilk test)** and **homogeneity of variances (via Levene's test)**—were tested and clearly documented. If significant violations were detected, appropriate adjustments were made either through non-parametric testing or data transformation techniques.

Significance Level and Confidence Intervals

All statistical tests were **two-tailed**, and a **p-value < 0.05** was considered statistically significant. Confidence intervals at **95%** were reported alongside p-values to reflect the precision and reliability of the estimates. Where applicable, **effect sizes** (e.g., Cohen's d or η^2) were included to complement p-values and contextualize the magnitude of observed differences or associations.

Data Quality and Missing Values

Prior to analysis, the dataset was **screened for missing values**, outliers, and data-entry errors. Cases with missing responses exceeding 10% were excluded from the final analysis to preserve data integrity. For instances of minimal missing data, **pairwise deletion** was applied. Consistency checks and logic verifications were conducted to ensure data quality.

By integrating both descriptive and inferential techniques,

the statistical analysis framework provided a comprehensive evaluation of the therapeutic garden experience. It enabled the researchers to not only describe patterns of patient responses but also to **explore meaningful relationships** among emotional, physical, and environmental variables—thus reinforcing the multidimensional nature of healing in clinical settings.

Results

Observation

Among the 500 respondents who participated in the study, a substantial proportion—**62.4%**—were **inpatients** undergoing treatment for more than five days, while **37.6%** were **outpatients** engaged in routine follow-up care or post-operative monitoring. This distribution allowed the study to explore the healing environment's effect across varying clinical timelines, from acute admissions to longer rehabilitative phases. The **age range of participants (18–78 years)** with a **mean of 46.2 ± 13.7 years** offered a mature, multigenerational perspective that reflected the broader patient population in regional hospitals.

Demographically, the sample was **balanced in terms of gender**, with relatively equal numbers of male and female participants, allowing for equitable gender representation. Participants also represented **diverse medical diagnoses**, including chronic illness, post-surgical recovery, infectious disease, oncology, and musculoskeletal conditions. Importantly, this heterogeneity in background and clinical trajectory enriched the qualitative depth of quantitative measures. In terms of exposure frequency, participants varied in how often they engaged with hospital gardens, either through direct interaction or visual proximity. This natural variability contributed to a more **ecologically valid** interpretation of garden impact under real-world hospital conditions.

Orientation

This study was grounded in the hypothesis that **therapeutic gardens**—as intentional, human-centered environmental features—could meaningfully enhance the **comfort, emotional stability, and healing motivation** of hospitalized individuals. These constructs were operationalized using a **culturally validated Likert-scale questionnaire**, ensuring that patients from a range of educational, linguistic, and ethnic backgrounds could engage meaningfully with the items.

Participants' experiences with the garden environment fell along a continuum of **active and passive engagement**. Some chose to walk, sit, or pray in garden areas, while others drew comfort simply from seeing greenery and flowers through a window. This inclusivity of sensory modes acknowledged the diversity of patient capabilities and preferences. Importantly, the hospital gardens were not just aesthetic embellishments; they served as **micro-sanctuaries** that temporarily lifted patients from the psychological burdens of hospitalization. The study's design thus honored a central tenet of holistic care: that healing occurs not only in the body but also in the **mind and spirit**.

Objectivity

The quantitative results affirmed the original hypothesis with strong and consistent findings across all measured domains. The **mean score for Comfort Level (4.41 ± 0.52)** reflected a broadly positive experience of the hospital space, with patients expressing a sense of being “at ease,” “soothed”, and “mentally rested.” The **Emotional Well-being score (4.52 ± 0.46)** was the highest of the three, revealing the profound emotional resonance that natural elements—especially vibrant flowers and the scent of plants—had on patients coping with illness and uncertainty.

The **Perceived Recovery score (4.38 ± 0.55)** further underscored that patients saw garden exposure not only as a source of peace but as an **active agent in their healing journey**. This was not simply psychological optimism; many participants described feeling physically lighter, sleeping better, and being more willing to participate in physiotherapy or medical procedures after visiting the garden.

Statistical analysis reinforced these findings with **highly significant differences based on exposure frequency (p < 0.001)**. Those who interacted daily with garden areas reported **notably higher recovery and mood scores** than those who engaged infrequently. **Pearson’s correlation analysis** confirmed a **strong positive association** between emotional well-being and recovery (r = 0.781, p < 0.001), and between comfort and emotional well-being (r = 0.693, p < 0.001). These data reveal a deeply interconnected relationship between environmental serenity and internal healing momentum.

Interestingly, **older adults (>60 years)** demonstrated slightly elevated emotional scores, particularly among those hospitalized for extended periods. This suggests that aging patients—often more susceptible to loneliness and psychological distress—may derive **greater emotional nourishment** from nature-rich environments. Their heightened sensitivity to ambient aesthetics might be viewed not as vulnerability, but as **receptivity to therapeutic context**.

Outcome

The findings of this study point toward a **transformative potential** of incorporating therapeutic gardens into hospital design—not merely for visual beautification, but as a **deliberate clinical tool** for enhancing patient well-being. The presence of natural elements such as colorful flora, aromatic plants, shaded sitting areas, and rhythmic spatial flow created **an immersive atmosphere of dignity, hope, and quiet strength**. Patients described the gardens as places where they could “breathe freely”, “find silence amid chaos”, and “remember that life continues beyond illness”.

These experiential narratives were reflected in the data: patients consistently reported **reduced stress, enhanced rest, greater emotional stability, and heightened motivation to heal**. These effects were not only statistically significant but **clinically meaningful**, as they occurred in real patient settings—amid pain, diagnosis, and medical procedures.

These results substantiate a growing global body of evidence that

supports **non-pharmacological, nature-based interventions** in clinical care. As echoed by Jennings and Bamkole [9] and expanded by Nejati et al. [10], environments that foster sensory comfort and psychological security can enhance physiological recovery pathways and mitigate the emotional toll of illness. In doing so, they not only serve the science of health but restore the **humanity of healing**.

Originality

This study contributes uniquely to the global evidence base by offering **culturally grounded, real-world data** from district hospitals in Indonesia—healthcare settings that, despite their ubiquity in the Global South, have been largely underrepresented in environmental health literature. In contrast to research emerging from high-income countries with abundant resources, this study highlights the **feasibility and effectiveness of therapeutic garden interventions in modest, often resource-constrained hospital contexts**.

It provides compelling **empirical support for integrating nature-based design elements** into patient care models not as peripheral add-ons, but as **core components of therapeutic architecture**. The findings elevate the importance of considering natural aesthetics, spatial harmony, and sensory richness as non-pharmacological resources with measurable effects on patient comfort, emotional regulation, and perceived recovery.

Moreover, this research asserts that **healing is not exclusively a biochemical outcome—it is also shaped by place, perception, and psychological safety**. In a world where clinical metrics often dominate decision-making, these insights restore balance by bringing back the **human dimension of healing**, where the patient is seen, not only as a diagnosis, but as a whole person—sensitive, vulnerable, and deeply responsive to their surroundings.

By shedding light on this often-overlooked facet of healthcare in Southeast Asia, the study also invites broader conversations on **environmental justice, cultural relevance, and design equity** in hospital planning worldwide. It is a reminder that the act of caring extends beyond interventions and medications—it also lives in the spaces we create, the environments we tend, and the **empathy we embed into every corner of care**.

Table 1: Descriptive Statistics of Outcome Domains (n = 500).

Domain	Mean ± SD	Minimum	Maximum
Comfort Level	4.41 ± 0.52	2.7	5.0
Emotional Well-being	4.52 ± 0.46	3.1	5.0
Perceived Recovery	4.38 ± 0.55	2.9	5.0

The data presented in Table 1 reveal consistently elevated mean scores across all three measured domains—**Comfort Level, Emotional Well-being, and Perceived Recovery**—demonstrating that participants perceived the therapeutic garden environments as profoundly beneficial to their overall hospital experience.

The **Comfort Level domain**, with a mean score of **4.41 (SD ±**

0.52), reflects more than mere physical satisfaction; it signals a deep sense of **spatial safety, familiarity, and psychological ease**. In an environment often associated with fear, vulnerability, and uncertainty, patients reported that the presence of natural elements—flowers, greenery, soft air movement, and natural light—contributed to a **restorative ambiance**, gently counterbalancing the clinical sterility of traditional hospital interiors.

The **Emotional Well-being** domain received the highest average score at **4.52 (SD ± 0.46)**. This finding suggests that nature-inspired design elements in hospital settings do not merely serve aesthetic purposes but also activate a **psychosensory response** that nurtures emotional resilience. Participants consistently described feeling calmer, more hopeful, and emotionally grounded—experiences that align with the body of evidence emphasizing nature’s role in reducing anxiety, stabilizing mood, and supporting emotional regulation during periods of physical illness and psychological strain.

Meanwhile, the **Perceived Recovery** domain yielded a robust mean of **4.38 (SD ± 0.55)**, reinforcing the view that healing is not only a biological process, but also one that is shaped by **patients’ beliefs, perceptions, and motivational states**. Many participants interpreted their interaction with garden spaces as an invitation to move, breathe, reflect, and participate actively in their own recovery. This sense of agency—fostered by connection with nature—often translated into improved sleep, reduced pain perception, and greater willingness to adhere to medical treatments.

Importantly, the narrow range of standard deviations across domains reflects a **remarkable uniformity** in patient perceptions, regardless of individual differences such as age, diagnosis, or length of stay. This suggests that the **therapeutic impact of healing gardens is not isolated to specific patient groups** but rather represents a universally accessible, low-cost, and culturally resonant intervention capable of enhancing the inpatient and outpatient experience alike.

In sum, Table 1 offers compelling quantitative evidence that supports the **re-humanization of clinical spaces** through environmental design. It affirms that healthcare institutions—particularly in underserved regions—can advance patient recovery not only through medicine, but also through the **intentional cultivation of space, beauty, and serenity**.

Table 2: Correlation Matrix between Core Domains.

Variable	Comfort Level	Emotional Well-being	Perceived Recovery
Comfort Level	1.000	0.693**	0.612**
Emotional Well-being	0.693**	1.000	0.781**
Perceived Recovery	0.612**	0.781**	1.000

Table 2 presents a clear and statistically robust correlation among the three core domains assessed in this study—**Comfort Level, Emotional Well-being, and Perceived Recovery**. The data reveal not only the strength of these interrelationships but also the **deeply**

interconnected nature of human healing as experienced by patients within therapeutic hospital environments.

The **strong correlation between Emotional Well-being and Perceived Recovery (r=0.781, p<0.001)** is especially noteworthy. It suggests that the way a patient feels emotionally—particularly feelings of calmness, hope, reduced anxiety, and emotional stability—has a powerful influence on how they perceive their own physical healing. In essence, this confirms that **emotional restoration is not a secondary outcome of medical care, but a core component of the recovery process itself**. Patients who reported feeling emotionally uplifted were more likely to also report that they were recovering well, underscoring the holistic nature of the healing journey.

The relationship between **Comfort Level and Emotional Well-being (r = 0.693, p < 0.001)** reinforces the idea that **the environment in which healing occurs shapes emotional states in significant ways**. When hospital settings are designed with human-centered principles—such as the presence of natural beauty, spatial openness, and multisensory harmony—patients tend to feel emotionally safer and more settled. These feelings of comfort extend beyond physical ease; they speak to **a sense of being cared for, respected, and seen as a whole person** rather than merely a clinical case.

Furthermore, the **moderate-to-strong correlation between Comfort Level and Perceived Recovery (r = 0.612, p < 0.001)** suggests that the physical and sensory environment contributes meaningfully to how patients evaluate their healing progress. A soothing, flower-rich garden or a thoughtfully placed bench near greenery may not directly alter cellular biology, but it can dramatically influence **a patient’s mindset, their sense of agency, and their motivation to engage in healing behaviors**.

Collectively, these correlations highlight the **synergistic relationship between the external environment and internal experience**. They validate the principle that healing cannot be separated into discrete medical and emotional categories; rather, it is an integrative phenomenon where space, perception, and physiology are in constant dialogue.

For clinicians, administrators, and healthcare designers, these findings provide **quantifiable justification for investing in nature-based design interventions** within hospital systems. Especially in settings where pharmacological resources may be limited, enhancing the care environment becomes not only an ethical imperative but also a **scientifically supported strategy to improve patient outcomes**.

Ultimately, Table 2 exemplifies how statistical patterns, when interpreted through a humanistic lens, tell a story of **interdependence, empathy, and the quiet power of thoughtful design** in shaping the recovery experience.

Discussion

This study provides compelling evidence that therapeutic garden environments integrated into hospital settings contribute meaningfully to the multidimensional recovery of patients. The high scores observed across the domains of **comfort, emotional well-being, and perceived recovery**—alongside their strong statistical correlations—affirm the role of **nature exposure as a biological, psychological, and existential resource** in modern healthcare.

From a **molecular and biochemical perspective**, contact with natural environments initiates a cascade of neurochemical and immunomodulatory processes that contribute to healing. Visual and olfactory stimulation from flowers and green plants has been shown to activate the **parasympathetic nervous system**, promoting relaxation and lowering sympathetic arousal. This autonomic shift results in measurable reductions in **heart rate, blood pressure, and salivary cortisol**, all of which are biomarkers of stress [11].

Beyond autonomic regulation, interaction with natural environments also influences the **hypothalamic–pituitary–adrenal (HPA) axis**, which plays a central role in stress adaptation. Studies have demonstrated that regular exposure to biophilic environments downregulates excessive HPA activation, thereby mitigating chronic stress responses that could otherwise impair wound healing, increase inflammation, and suppress immunity [12].

More specifically, **phytoncides**—volatile organic compounds released by plants and flowers—have been identified as biologically active agents that enhance **natural killer (NK) cell activity**, increase **interleukin-10 (IL-10)** production (an anti-inflammatory cytokine), and reduce levels of **tumor necrosis factor-alpha (TNF- α)** and **C-reactive protein (CRP)** [13]. These immune-modulating effects not only accelerate tissue regeneration but also reduce susceptibility to nosocomial infections, particularly in immunocompromised patients.

On a neurochemical level, exposure to gardens rich in floral diversity has been associated with increased secretion of **serotonin** and **dopamine**, neurotransmitters responsible for regulating mood, pleasure, and motivation. The color spectrum of blooming flowers and their natural symmetry have been shown to stimulate the **visual cortex**, while the scent molecules—especially **linalool, geraniol, and benzyl acetate**—bind to olfactory receptors that influence the **limbic system**, including the **amygdala** and **hippocampus**, areas critical to emotional processing and memory regulation [14].

These mechanisms explain why patients in this study reported feeling “peaceful”, “refreshed,” and more “motivated” following time spent in garden spaces. Such sensations are not merely subjective impressions—they are **rooted in biological alterations of neuroimmune and hormonal pathways**. In the context of hospitalization, where emotional fatigue and sensory monotony are prevalent, gardens offer a therapeutic contrast that recalibrates

the body's internal environment toward homeostasis.

Additionally, the statistically significant correlation between **emotional well-being and perceived recovery** ($r = 0.781$) aligns with the theory of **psychoneuroimmunology**, which posits that psychological states can directly influence immune competence. Positive emotions have been linked to increased **lymphocyte proliferation**, improved **macrophage efficiency**, and elevated levels of **secretory IgA**, all of which are essential for resisting infection and accelerating recovery post-surgery or during chemotherapy [15].

Importantly, this study emphasizes that healing is not confined to the molecular level—it also arises from the **human experience of place**. The notion that a hospital garden can serve as a refuge of dignity, agency, and quietude speaks to the essence of nursing as a discipline grounded in **compassionate presence**. In settings where medical technologies dominate, the inclusion of sensory- and soul-enriching spaces restores equilibrium, not only for patients but also for families and staff navigating the stresses of clinical care.

Moreover, the **cultural relevance** of nature-based healing cannot be overstated in the Indonesian context. The integration of floral and herbal elements into daily spiritual and communal life creates a resonance that amplifies the psychological benefits. When therapeutic landscapes mirror cultural values, their **biophilic impact becomes both biologically and symbolically restorative**.

These findings also offer strategic implications for hospital design policy, especially in resource-limited settings. Healing gardens require relatively modest financial investment yet deliver substantial psychosocial and physiological returns. Given their capacity to **modulate inflammation, enhance immunity, and elevate mood through endogenous biochemical shifts**, gardens should be viewed not as ancillary features but as **evidence-based environmental interventions**.

Limitations and Future Directions

While the study's cross-sectional design limits causal inference, the **large sample size and consistent findings** across patient subgroups strengthen its generalizability. Future research should consider **longitudinal and biomarker-based studies**, including cortisol levels, inflammatory markers, and neuroimaging, to further elucidate the **molecular underpinnings of environmental healing**.

Moreover, exploration into how specific garden elements—color, biodiversity, scent profiles—affect clinical outcomes across different cultural contexts could enrich the global understanding of **environmental therapeutics**.

Conclusion

This study demonstrates that therapeutic garden environments embedded within hospital settings significantly enhance patients' comfort, emotional well-being, and perceived recovery. The strong positive correlations among these domains highlight

the multidimensional nature of healing, which extends beyond pharmacological interventions to include sensory, psychological, and spatial experiences.

Healing is not merely the resolution of symptoms—it is a deeply embodied and emotionally meaningful process shaped by where, how, and with whom recovery takes place. The findings underscore that the integration of nature into clinical spaces offers tangible physiological and psychological benefits, reaffirming the critical role of environment as a silent but powerful partner in the healing journey.

By presenting empirical evidence from culturally grounded Indonesian hospital settings, this research affirms that even in resource-limited contexts, the presence of green and flower-rich environments can serve as cost-effective, patient-centered, and sustainable strategies for promoting holistic recovery.

Implications for Nursing Practice

1. Humanized Care through Environment

Nurses play a pivotal role in advocating for and utilizing healing spaces as part of daily care. Recognizing the therapeutic potential of gardens allows nurses to guide patients toward spaces that reduce anxiety, enhance comfort, and foster emotional resilience.

2. Non-Pharmacological Interventions

Therapeutic gardens can serve as complementary approaches to symptom management, particularly for stress, insomnia, mild depression, and emotional fatigue. Nurses should incorporate nature exposure into patient care plans when appropriate.

3. Cultural and Spiritual Sensitivity

Incorporating nature-based healing aligns with many patients' cultural and spiritual values. Nurses can enhance trust and rapport by acknowledging and supporting patients' connection with natural elements during their recovery.

4. Environmental Awareness in Clinical Decision-Making

This study encourages nurses to think beyond traditional clinical tools and include environmental factors in assessments and care planning. The physical layout, view, light, and access to gardens should be considered in room assignments and activity scheduling.

5. Nursing Leadership in Facility Design

Nurse leaders and administrators should actively participate in hospital planning and environmental design. Their insights into patient experience are essential in shaping spaces that reflect care, dignity, and healing.

6. Self-Care for Nurses

Healing gardens not only benefit patients but also offer restorative spaces for nurses themselves. Encouraging staff to access these areas can help reduce burnout and enhance emotional balance, ultimately improving the quality of care delivered.

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