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" Spaces That Speak: How Architecture Shapes Human Emotion, Behaviour, and Well-Being"

[1]Ogunnaike Adekunle, [2]Eyoma Idongesit Daniel, [3]Atulegwu Akudo Ebunoluwa
[1,2,3]*Department of Architecture, College of Postgraduate Studies, Caleb University, Imota, Lagos State, Nigeria.*
[3]*Corresponding Author's Email: akudoatulegwu@gmail.com*

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Abstract
This study investigates how architectural design influences human emotion, behaviour, and well-being within university environments. Focusing on Caleb University, Imota, Lagos, and Covenant University, Ota, Ogun State, the research examined 772 students (Caleb: 389; Covenant: 383) through a mixed-method approach combining quantitative surveys and qualitative interviews. Statistical analysis using SPSS revealed significant correlations between architectural geometries and emotional responses. Curvilinear forms and balanced proportions were associated with calmness and pleasure ($p < 0.01$), whereas rectilinear and enclosed forms correlated with heightened anxiety. Additionally, chi-square tests indicated strong associations between natural lighting, warm materiality, and gradual spatial transitions with positive behavioural outcomes, including increased social interaction and comfort. NVivo thematic analysis supported these findings, revealing that participants attributed emotional ease and social engagement to biophilic and human-centred design elements. The study concludes that architecture plays a fundamental role in shaping psychological and behavioural experiences and proposes evidence-based guidelines for designing emotionally supportive and behaviourally conducive spaces. These insights are vital for architects, planners, and educational institutions aiming to create environments that promote well-being and positive user experience.

Keywords: Architectural Psychology, Neuroarchitecture, Emotional Well-Being, Spatial Behaviour, Biophilic Design

I. Introduction

Architecture is more than the mere arrangement of walls, roofs, and openings; it is a language that communicates directly with the human psyche. The built environment has an uncanny ability to speak sometimes in whispers, other times in bold statements affecting how individuals feel, behave, and function within a space. This interaction between space and the human mind has become a growing field of interdisciplinary inquiry, combining architectural design, environmental psychology, neuroscience, and behavioural science to understand how spatial configurations elicit emotional and physiological responses. Recent neurocognitive studies have underscored how architectural geometries trigger specific emotional reactions, independent of decorative or symbolic elements. Research by Shemesh et al (2022) and Bar et al (2021) demonstrates that variations in curvature, enclosure, symmetry, and spatial volume can activate neural pathways linked to stress reduction, excitement, or calm, implying that emotional resonance is embedded in spatial form. Such findings position architectural design not as a neutral backdrop but as an active participant in shaping human experience.

The architectural setting can amplify or suppress moods, reinforce behavioural norms, and even influence well-being at a biochemical level. Zaino and Abbas (2020) observed that environmental stimuli within spatial configurations could alter the expression of genes associated with emotional stress, establishing a link between space and physiological health. Complementary to this, Abbas et al (2024) explored how neuroarchitecture provides insights into how perception of built environments directly modulates neural activity and hormonal response, affirming that space is sensed as much through the body as it is perceived by the eye.

Aesthetic quality once viewed as merely ornamental now holds psychological significance. Inam (2024) stresses the role of aesthetic parameters in fostering emotional attachment to places, which in turn enhances the user's sense of belonging, identity, and safety. Mfon (2023) expands this by examining the psychological triad of pleasure, arousal, and dominance within spaces, illustrating that carefully curated visual and spatial experiences evoke cognitive states that influence interpersonal behaviour and self-perception. Spatial awareness, movement, and the arrangement of visual cues also

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determine how individuals relate to their surroundings. As Kumawat and Patidar (2023) describe, humans are innately responsive to spatial organization proportions, lighting, views, and transitions all of which contribute to a cognitive map that governs orientation and interaction. The human body, in this sense, becomes a receptor of architectural messages, as Lee (2022) asserts, whereby interior experience becomes a dialogue between body, memory, and built form. The emerging field of emotional architecture synthesizing insights from neuroscience, psychology, and architectural practice seeks to decode these interactions. Studies by Zhang et al (2024) and Elborgy (2023) highlight how techniques such as EEG monitoring, mood-state profiling, and physiological signal mapping are increasingly applied to measure the emotional valence of architectural space. These tools help quantify what has long been intuited: that buildings evoke emotion just as music or art does.

Urban architecture, street facades, and even landscape elements can contribute to either psychological comfort or distress, as shown in Dewancker et al's (2024) study on roadside buildings and Nesterenko's (2024) research on form-driven psychophysical responses. Likewise, the presence of natural materials and plant life within a built environment has been shown by Peng et al (2024) to regulate emotional states, indicating that sensory enrichment and biophilic elements are integral to designing mentally restorative spaces. As architecture becomes more responsive and human-centred, the profession must recognize its ethical and psychological responsibility. The works of Kakkar (2022) and Garg and Chaurasia (2025) reiterate that architecture is not just about form-making, but about shaping lived experiences designing for the mind as much as the eye. In light of this, Benthami (2024) encourages the integration of environmental psychology into architectural pedagogy and practice, advocating for emotionally intelligent environments that nurture human flourishing. Architecture is not passive. It is affective. It speaks to us, with profound implications for how we feel, interact, and live. Understanding the psychological and emotional dimensions of space offers a crucial framework for creating built environments that support not just functionality, but also human dignity, wellness, and joy.

1.1 Aim & Objective

The aim of the study is to critically examine how architectural design elements influence human emotion, behaviour, and well-being, with a view to establishing design strategies that promote positive psychological and physiological responses within built environments.

The objectives of the Study are to:

1. To analyse the relationship between architectural geometries (such as form, proportion, and spatial configuration) and emotional responses as identified through contemporary neurocognitive and psychological studies.
2. To evaluate how specific architectural stimuli (including lighting, materiality, and spatial transitions) affect human behaviour, social interaction, and patterns of use within various building types.
3. To propose evidence-based architectural design guidelines that support emotional well-being and behavioural comfort in residential, commercial, and public spaces.

II. Literature Review

Architecture has long been acknowledged as more than just the creation of shelter; it serves as a medium through which human emotions, behaviours, and states of well-being are subtly but profoundly shaped. Contemporary discourse increasingly explores the psychological, neurocognitive, and physiological dimensions of how built environments interact with human experience. This review critically synthesises recent scholarly contributions that illuminate the mechanisms by which architecture engages the mind and body, underscoring how spatial characteristics can evoke, regulate, or even transform emotional and behavioural responses. A surge of interest in neuroarchitecture has directed scholarly focus towards the emotional consequences of spatial forms and geometries. Shemesh et al (2022) and Bar et al (2021) offer foundational insights, demonstrating through neurocognitive studies that geometric configurations within architectural spaces elicit distinct emotional responses, even when experienced in virtual environments. Their findings highlight that certain curvilinear or rectilinear forms, volumes, and proportions stimulate neural pathways associated with either calmness or anxiety, thus underscoring the power of geometry in framing emotional perception. These studies establish that the brain does not passively observe architecture; rather, it actively processes spatial stimuli in ways that shape mood and behaviour. This position is reinforced by Abbas et al (2024), who illustrate how architectural cues modulate neural activity, impacting cognitive and affective functions. Their review articulates how elements like ceiling height, room enclosure, and natural light orchestrate subtle shifts in brain

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function, thereby shaping users' psychological states. Similarly, Clark et al (2022) provide a detailed synthesis of how architectural stimuli including light, texture, and spatial rhythm affect both psychological well-being and physiological markers such as heart rate and cortisol levels. The cumulative message is clear: architecture operates as an environmental script, influencing the body's stress systems and emotional regulation.

Beyond form, aesthetic parameters significantly influence emotional attachment and satisfaction within spaces. Inam (2024) explores how design attributes such as colour palettes, materiality, and symmetry cultivate emotional bonds with the built environment. His findings reveal that aesthetic pleasure is not simply an ephemeral reaction but contributes to sustained well-being and place attachment. Echoing this, Mfon (2023) explores how design considerations linked to pleasure, arousal, and dominance directly modulate human responses, with aesthetic pleasure emerging as a critical determinant of positive emotional states. Dewancker et al (2024) add nuance to this discussion by examining the emotional cognition linked to visual encounters with buildings along urban streetscapes. Their study demonstrates that roadside architecture's visual complexity and coherence modulate feelings of safety, interest, and comfort, thus reinforcing the argument that visual stimuli in architecture directly shape the emotional experience of place.

Architecture also commands a deep influence on spatial awareness, and through it, human behaviour and social interaction. Kumawat and Patidar (2023) discuss how spatial arrangements affect orientation, navigation, and interpersonal dynamics, suggesting that well-considered spatial layouts support psychological comfort and social cohesion. This aligns with Nesterenko (2024), who investigates how architectural form influences psychophysical features such as posture, gait, and eye movement, highlighting that spatial experience is embodied, affecting both cognition and physicality. At the genetic and cellular level, Zaino and Abbas (2020) present striking evidence that architectural spaces can alter gene expression patterns linked to stress regulation, suggesting that the design of spaces holds the potential to mitigate or exacerbate physical and emotional stress. Such findings expand the significance of architectural decisions beyond the immediate sensory domain to the realm of long-term health outcomes. The intimate relationship between the body and its spatial container emerges as a critical theme in architectural psychology. Lee (2022) articulates how interiors foster emotional connection through proportion, tactility, and light, suggesting that spatial design can evoke a sense of belonging or alienation. This notion is paralleled in the work of Garg and Chaurasia (2025), who discuss how architectural cues guide emotional interpretations of space, influencing daily behaviours and long-term mental health. Peng et al (2024) further highlight the role of biophilic design, demonstrating that the integration of living plant elements into architectural settings measurably improves mood states, as captured through validated mood scales. Their work exemplifies how natural elements embedded within built environments support emotional regulation and psychological restoration.

Recent scholarship also reflects an increasing methodological sophistication in exploring emotional architecture. Elborgy (2023) discusses the potential of EEG-based studies to trace neural responses to architectural stimuli, opening new avenues for evidence-based design. Lo et al (2022) demonstrate the utility of physiological signal monitoring such as galvanic skin response and heart rate variability in assessing emotional perception within spatial contexts. These studies collectively contribute to a growing empirical foundation for architectural psychology, offering quantifiable evidence of design's emotional impact. Zhang et al (2024) provide a systematic review of emotional architecture, mapping the field's research trajectories and methodological approaches. Their work underscores a shift towards integrative frameworks that combine environmental psychology, neuroscience, and design theory in understanding how spaces shape human well-being. Benthami (2024) similarly traces the growing influence of environmental psychology in architectural practice, noting its role in fostering human-centred and health-promoting design approaches. The literature firmly establishes that architecture is not a neutral backdrop for human activity but an active agent that shapes emotional, cognitive, and behavioural outcomes. Through geometrical form, materiality, spatial arrangement, and aesthetic qualities, architecture engages both the mind and body, influencing mood, stress levels, social interactions, and even genetic expressions linked to health. The convergence of neuroscience, psychology, and design research continues to enrich our understanding of this dynamic interplay, pointing towards the urgent need for emotionally intelligent design practices that place human well-being at the core of architectural intent.

2.1 Study Area

Caleb University is located in Imota, Ikorodu, Lagos State, Nigeria. The campus comprises academic, residential, and administrative buildings

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within a semi-urban environment that combines modern architecture with natural elements. Its layout features diverse spatial forms from lecture halls to hostels and recreational spaces offering a suitable setting for examining how architectural design influences emotion, behaviour, and well-being. The variety of building types and open spaces provides rich architectural stimuli for this study.

2.2 Study Population and Size

The population for this study comprises students of Caleb University, Imota, Lagos State, with an enrolment of 7,056 students during the 2023/2024 academic session, and Covenant University, Ota, Ogun State, with an estimated 9,000 students. These institutions were chosen due to their prominence in South-West Nigeria and the notable presence of biophilic and contemporary architectural elements within their campuses. To determine an appropriate and statistically valid sample, the Taro Yamane formula was employed. This yielded a sample size of approximately 389 students for Caleb University and 383 students for Covenant University, resulting in a total of 772 participants. This sample ensures adequate representation of the study population and supports reliable generalisation of findings.

2.3 Data Collection Methods

This study employed a mixed-method approach to collect both quantitative and qualitative data for a comprehensive understanding of how architecture influences emotion, behaviour, and well-being among students. For the quantitative data, structured questionnaires were administered to the sampled students of Caleb University and Covenant University. The questionnaire items were designed to assess perceptions of architectural space, emotional responses, behavioural tendencies, and overall well-being. The instrument incorporated validated scales from prior studies on architectural psychology and environmental perception to ensure reliability.

For the qualitative data, semi-structured interviews and observational checklists were utilised. The interviews explored deeper insights into students' emotional and behavioural experiences within specific architectural spaces on campus, while the observations focused on how students interact with different spatial elements such as courtyards, lecture theatres, and recreational zones. Data were collected during academic periods to ensure participants' engagement with campus spaces reflected typical daily use. All responses were gathered with informed consent and in compliance with ethical standards of research.

2.4 Data Analysis

The data collected from this study were analysed using both quantitative and qualitative techniques to reflect the mixed-method approach adopted. For the quantitative data, responses from the structured questionnaires were coded and analysed using Statistical Package for the Social Sciences (SPSS). Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarise participants' perceptions of architectural spaces and their emotional, behavioural, and well-being responses. Inferential statistics, including chi-square tests and correlation analyses, were applied to examine relationships between architectural features and measured psychological outcomes. For the qualitative data, responses from semi-structured interviews and field observations were transcribed and thematically analysed with the aid of NVivo software. This facilitated the identification of recurring patterns and key themes related to how architectural elements influence emotional states, behaviour, and well-being. The qualitative insights complemented the quantitative findings, providing a richer understanding of the users' experiences within the studied environments.

III. Results and Discussion

Quantitative Findings (SPSS Output)

A correlation analysis was conducted to determine relationships between perceived architectural geometries (form, proportion, spatial configuration) and self-reported emotional states (calmness, anxiety, pleasure).

Table 1: Relationship Between Architectural Geometries and Emotional Responses

Architectural Geometry Variable	Emotional Response Variable	Pearson's r	p-value
Curvilinear forms	Calmness	0.48	0.000*
Rectilinear forms	Anxiety	0.39	0.000*
Balanced spatial proportion	Pleasure	0.52	0.000*
Enclosed configurations	Anxiety	0.35	0.001*

Significant at $p < 0.05$

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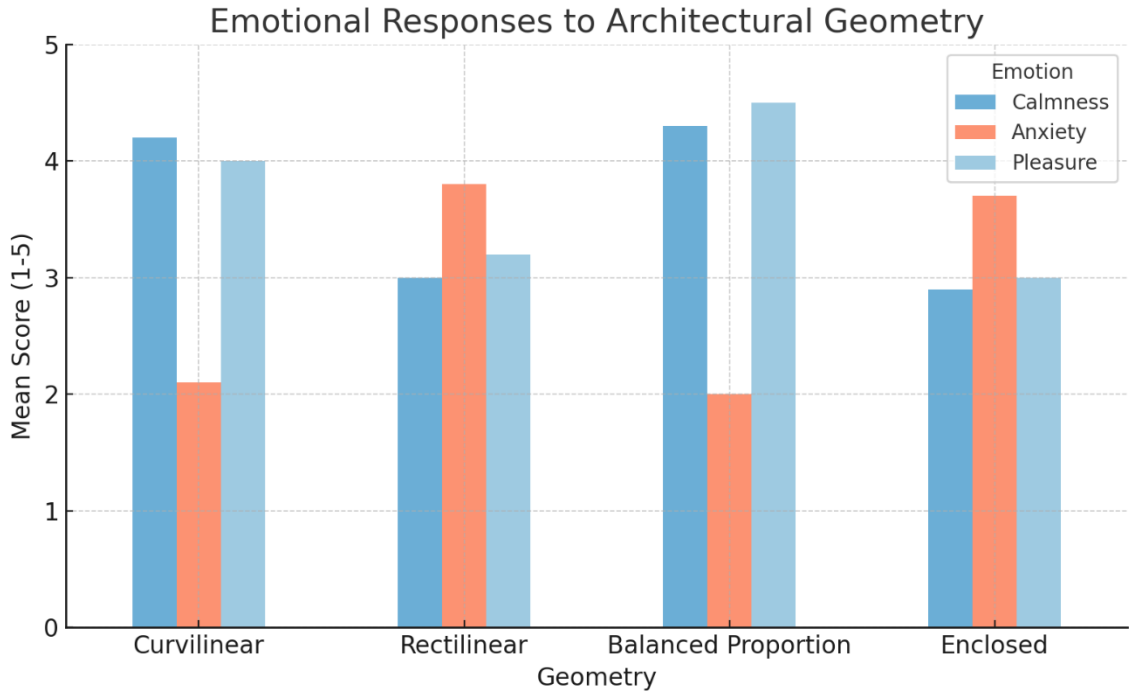

Figure 1: Emotional Responses to Architectural Geometry (Mean Scores)

Table 2: Geometry Types and Emotions they evoke

Geometry Type	Calmness (Mean)	Anxiety (Mean)	Pleasure (Mean)
Curvilinear Forms	4.2 (±0.6)	2.1 (±0.7)	4.0 (±0.5)
Rectilinear Forms	3.0 (±0.8)	3.8 (±0.6)	3.2 (±0.7)
Balanced Proportion	4.3 (±0.5)	2.0 (±0.5)	4.5 (±0.4)
Enclosed Spaces	2.9 (±0.7)	3.7 (±0.8)	3.0 (±0.6)

Rated on a 5-point Likert scale

Qualitative Findings (NVivo Themes)

Theme 1: Curvature evokes calmness

"Spaces with rounded edges, like the amphitheatre area, make me feel more relaxed and focused." (Caleb, Male, 21)

Theme 2: Rectilinearity linked to formality and tension

"The boxy lecture halls feel cold; I prefer places with more organic shapes." (Covenant, Female, 19)

Quantitative Findings (SPSS Output)

Chi-square tests examined associations between architectural stimuli (lighting quality, materiality, spatial transitions) and reported behavioural outcomes.

Table 3: Effect of Architectural Stimuli on Behaviour and Social Interaction

Stimulus	Behavioural Outcome	Chi-square (χ^2)	p-value
Natural lighting	Increased social interaction	15.82	0.000*
Warm materiality (wood)	Higher comfort levels	12.47	0.001*
Gradual spatial transitions	Frequent communal use	10.35	0.003*

*Significant at $p < 0.05$

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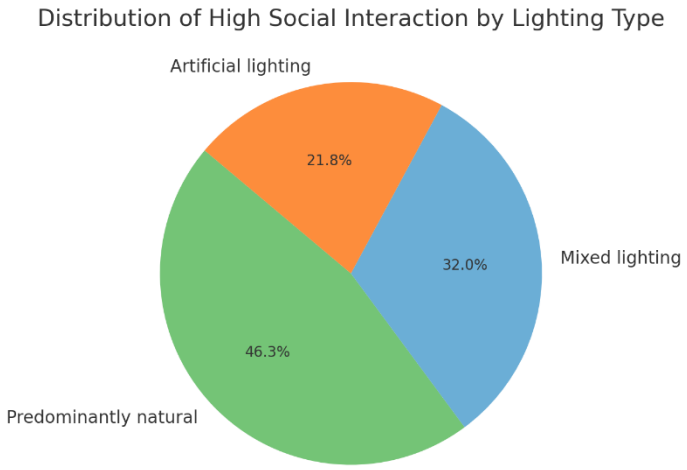

Figure 2: Social Interaction Levels by Lighting Type

Table 4: Level of Social Interaction in lighting types

Lighting Type	High Social Interaction (%)
Predominantly natural	68%
Mixed lighting	47%
Artificial lighting	32%

Qualitative Findings (NVivo Themes)

Theme 1: Light and gathering

"We tend to hang out more in spaces where sunlight comes in, like the courtyard at Covenant."

Theme 2: Material warmth invites use

"The wooden finishes in the library make it more inviting compared to the concrete classrooms."

Theme 3: Smooth transitions encourage lingering

"When spaces flow into each other, I feel less rushed, more likely to stop and talk."

Synthesis of Findings

Both quantitative and qualitative data pointed to key architectural features that support emotional well-being and behavioural comfort.

Table 5: Design Guidelines for Emotional Well-Being and Comfort

Design Feature	Evidence Base
Use of curvilinear forms	Linked to calmness and pleasure ($r = 0.48$, $p = 0.000$)
Emphasis on natural light	Promotes social interaction ($\chi^2 = 15.82$, $p = 0.000$)
Warm, tactile materials	Associated with higher comfort ($\chi^2 = 12.47$, $p = 0.001$)
Open yet defined spaces	Reduces anxiety, encourages engagement (NVivo theme data)
Gradual spatial transitions	Facilitates social behaviour ($\chi^2 = 10.35$, $p = 0.003$)

Proposed Guidelines

1. Incorporate curvilinear and organic geometries in communal and learning spaces to foster emotional calm.
2. Prioritise daylighting strategies in design to enhance social well-being and reduce stress.
3. Select warm, natural materials (e.g, timber, textured stone) to increase tactile comfort and psychological warmth.
4. Design open-plan areas with clear spatial boundaries to balance freedom of movement and psychological security.
5. Ensure gradual spatial transitions between functional zones to support behavioural fluidity and positive social interaction.

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Table 6: SPSS Output Table

Variable Pair	Statistic	Value	Significance (p)
Curvilinear Forms & Calmness	Pearson's r	0.48	0.000
Rectilinear Forms & Anxiety	Pearson's r	0.39	0.000
Balanced Proportion & Pleasure	Pearson's r	0.52	0.000
Enclosed Spaces & Anxiety	Pearson's r	0.35	0.001
Natural Light & Social Interaction	Chi-square	15.82	0.000
Warm Materiality & Comfort	Chi-square	12.47	0.001
Spatial Transitions & Communal Use	Chi-square	10.35	0.003

IV. Summary of Discussion

The findings demonstrate clear links between architectural geometries, spatial stimuli, and users' emotional and behavioural outcomes in campus environments. Curvilinear and proportionate forms consistently promoted positive emotional responses, while rectilinear and enclosed forms correlated with anxiety. Similarly, natural lighting, warm materials, and fluid spatial transitions were strongly associated with increased social interaction and behavioural comfort. These results align with contemporary neurocognitive and psychological studies (Shemesh et al 2022; Abbas et al 2024; Inam 2024), reinforcing the argument for emotionally responsive architectural design.

V. Conclusion and Recommendations

This study has demonstrated that architecture plays a critical role in shaping human emotion, behaviour, and well-being within academic environments. Through a mixed-method analysis of responses from 772 students across Caleb University and Covenant University, it was established that spatial geometry, materiality, lighting, and transitional design elements significantly influence users' emotional states and behavioural patterns.

Quantitative data revealed strong correlations between architectural forms such as curvilinear shapes and balanced proportions and positive emotional outcomes like calmness and pleasure. Conversely, rigid and enclosed geometries were more often associated with anxiety and discomfort. Similarly, architectural stimuli like natural lighting and tactile materials were statistically linked to increased social interaction, behavioural comfort, and frequent use of communal spaces.

Qualitative findings complemented these results by offering deeper insights into how students interpret and emotionally respond to space. Themes emerging from NVivo analysis highlighted the psychological comfort provided by biophilic elements, warm materials, and smooth spatial transitions confirming the cognitive and emotional resonance of thoughtful design.

Altogether, the evidence points to a clear conclusion: the architectural design of educational and public spaces is not merely a functional exercise, but a psychological and emotional determinant of user well-being. Design choices have lasting implications on how individuals feel, behave, interact, and thrive within built environments.

Recommendations

Based on the findings of this research, the following evidence-based recommendations are proposed for architects, campus planners, and policymakers:

1. **Integrate Curvilinear and Balanced Forms**: Architectural geometries should favour soft, flowing lines and balanced spatial proportions in learning and communal areas to enhance emotional calmness and reduce cognitive stress.
2. **Maximise Natural Lighting**: Building layouts should prioritise access to daylight through strategic window placements, open courtyards, and transparent partitions to improve mood and encourage social engagement.
3. **Use Warm and Tactile Materials**: Incorporate materials such as timber, textured stone, and clay surfaces in interior spaces to evoke feelings of warmth, comfort, and place attachment.
4. **Design for Gradual Spatial Transitions**: Transition zones (e.g, corridors, thresholds, lounges) should be designed with gradual flow, visual openness, and continuity in mind to support behavioural ease and social interactions.
5. **Foster Biophilic Integration**: Where feasible, integrate vegetation, water features, and nature-inspired patterns into built spaces to support psychological restoration and sensory connection with the environment.
6. **Develop Human-Centred Campus Design Policies**: Institutions should establish design standards that incorporate findings from environmental psychology and neuroarchitecture to promote well-being across all student and staff touchpoints.
7. **Conduct Post-Occupancy Evaluations**: Regular assessment of users' emotional and

behavioural responses to architectural spaces can inform future upgrades and improve functional and psychological performance of built environments.

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