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Perceived Campus Environments and Mental Health: The Mediating Role of Nature Connectedness

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ABSTRACT

University campuses in Southwest Nigeria offer integrated green spaces amid rapid urbanization and academic stressors, yet the mechanisms linking perceived campus environments to student mental health remain underexplored locally. This cross-sectional study examined the mediating role of nature connectedness in the relationship between perceived campus environmental qualities and psychological well-being among 767 undergraduate students from five institutions (University of Ibadan, Obafemi Awolowo University, Federal University of Technology Akure, Adeleke University, and Ekiti State University). Participants completed adapted measures of perceived greenness (5 items), perceived restorativeness (6-item subset from Hartig et al.'s PRS), nature connectedness (NR-6), and well-being (WHO-5 Well-Being Index). Structural equation modeling (path analysis) tested the hypothesized model, yielding excellent fit (CFI = 0.98, RMSEA = 0.038). Results showed significant positive direct effects of perceived greenness (β = 0.244) and restorativeness (β = 0.373) on well-being, and both on nature connectedness (β = 0.398 and 0.460, respectively). Nature connectedness strongly predicted well-being (β = 0.419) and partially mediated the greenness–well-being (indirect effect = 0.143, 61% of total) and restorativeness–well-being (indirect effect = 0.135, 39% of total) relationships. These findings extend Attention Restoration Theory and Stress Reduction Theory to tropical Nigerian campuses, highlighting nature connectedness as a key psychological pathway. Implications support biophilic campus design to enhance restorative green infrastructure, fostering resilience and mental health amid rising psychological challenges.

Keywords

Campus green spaces, Nature connectedness, Perceived restorativeness, Psychological well-being, Southwest Nigeria.

Introduction

University campuses in Southwest Nigeria represent essential environments for nurturing student well-being, particularly in a region characterized by rapid urbanization, tropical climate conditions, and escalating academic and socio-economic pressures [1-3]. Institutions such as the University of Ibadan, Obafemi Awolowo University (Ile-Ife), Federal University of Technology Akure, Redeemer's University (Ede), Adeleke University, and Ekiti State University often feature integrated green spaces within academic, administrative, residential, and recreational zones, providing shaded areas, biodiversity hotspots, and opportunities for relaxation amid the challenges of dense urban surroundings and limited natural access in host cities [1]. These campuses, situated within the West African Guinea Biodiversity Hotspot one of the world's richest yet threatened ecological zones offer unique potential for restorative natural elements that can counteract the stresses of higher education [2].

Yet, the intricate pathways linking perceived campus environments to mental health outcomes remain underexplored in the Nigerian context, despite growing evidence of rising psychological distress among students [4-6]. Drawing on the Stimulus Organism Response framework from environmental psychology, perceived campus attributes including green infrastructure, walkability, vegetation density, naturalness, blue spaces (where present), and overall landscape quality serve as primary external stimuli that influence students' internal cognitive and emotional processing through multi-sensory experiences [3,5,7].

Key theoretical foundations include Attention Restoration Theory, which posits that natural environments replenish depleted directed attention through involuntary "soft fascination," "being-away" from routine demands, a sense of "extent" (immersion and coherence), and "compatibility" with personal needs, thereby reducing mental fatigue and supporting academic performance [4,8,9]. Stress Reduction Theory further explains rapid, preconscious physiological recovery via parasympathetic activation upon exposure to nature, leading to lowered stress markers and improved mood [10].

Central to these processes is nature connectedness the subjective cognitive and emotional bond individuals form with the natural world, often measured as the degree to which nature is integrated into one's self-concept [11,12]. Higher nature connectedness amplifies the restorative and protective effects of environmental exposure, fostering greater psychological benefits such as enhanced resilience, positive affect, and overall well-being [13,14]. In Southwest Nigerian campuses, empirical local studies indicate that well-maintained green spaces create conducive learning atmospheres, alleviate psychological distress, promote emotional balance, support attention recovery, and contribute to stress reduction benefits that are especially pronounced given students' exposure to intense academic workloads, financial strains, and urban heat [1,3,15].

These restorative qualities are particularly salient in the region's context, where tropical greenery provides essential shade, biodiversity support, air quality improvement, and psychological relief from daily pressures, while also aligning with broader socioecological goals of preserving endemic species and ecosystem health [2]. Campus green spaces thus function not only as aesthetic or functional elements but as vital psychological resources that help students transition from states of depletion to baseline well-being, enhancing positive emotions, diminishing negative affect, and buffering against physiological stress responses [16-18].

Background to the Study

University campuses in Southwest Nigeria serve as vital environments for the intellectual, social, and psychological development of students, particularly within a context marked by rapid urbanization, tropical climatic conditions, and intense academic and socio-economic pressures [1-3]. Institutions such as the University of Ibadan, Obafemi Awolowo University, Federal University of Technology Akure, Adeleke University, and Ekiti State University feature integrated green spaces, including shaded courtyards, vegetation-rich areas, and biodiversity hotspots embedded within academic, residential, and recreational zones [1,2]. These campuses are situated within the West African Guinea Biodiversity Hotspot, one of the world's richest yet most threatened ecological zones, offering unique potential for restorative natural elements that can help counteract the stresses associated with higher education.

In recent years, mental health challenges among Nigerian university students have risen sharply, with prevalence rates of anxiety, depression, and stress often exceeding global averages. These challenges are driven by heavy academic workloads, financial strains, and the psychological demands of urban living [4,6,19]. Empirical local studies suggest that well-maintained campus green spaces can play a protective role by alleviating psychological distress, promoting emotional balance, supporting attention recovery, and contributing to stress reduction benefits that are especially relevant in the tropical Nigerian context, where greenery provides essential shade, improved air quality, and relief from urban heat [1,3,15].

The restorative potential of natural environments is well documented in environmental psychology. Attention Restoration Theory (ART) proposes that natural settings replenish directed attention depleted by routine academic demands through mechanisms such as "being-away," soft fascination, extent, and compatibility [4,8,9]. Complementing this, Stress Reduction Theory explains the rapid physiological recovery and mood improvement that occur through parasympathetic activation upon contact with nature [10]. The Stimulus-Organism-Response (SOR) framework further elucidates how perceived environmental qualities including green infrastructure, walkability, vegetation density, naturalness, and overall landscape aesthetics act as external stimuli that shape students' internal cognitive and emotional states [3,5,7].

A critical psychological mechanism linking campus environments to mental health is nature connectedness the subjective cognitive and emotional bond individuals develop with the natural world, often reflected in the extent to which nature is incorporated into one's self-concept [11,12]. Research indicates that stronger nature connectedness amplifies the restorative benefits of green spaces, thereby enhancing resilience, positive affect, and overall psychological well-being [13,14]. Although international studies have increasingly examined these relationships, the specific pathways particularly the mediating role of nature connectedness remain underexplored in the Nigerian higher education context. This is especially true for Southwest Nigerian campuses, where green spaces are frequently fragmented by infrastructural development and competing land-use priorities [1,17,18,20].

While some local studies have documented the general benefits of campus greenery on student well-being, important gaps persist concerning the multi-dimensional mediation processes and the role of perceived restorativeness in tropical urbanizing settings [3,21]. The present study therefore addresses these gaps by investigating the extent to which nature connectedness mediates the relationship between perceived campus environmental qualities (greenness and restorativeness) and psychological well-being among undergraduate students in selected Southwest Nigerian universities.

Statement of Problem

Mental health challenges among Nigerian university students have risen sharply, with prevalence rates of anxiety, depression, and stress often exceeding global averages due to academic workload, financial pressures, and urban environmental stressors [4,7,19]. In Southwest Nigeria, where major public and private universities

are concentrated, campus green spaces are frequently fragmented by rapid infrastructural development, limited land availability, and prioritisation of academic buildings over landscape design [1,17,20]. Although studies confirm positive associations between campus greenery and reduced stress, improved cognitive functioning, and higher life satisfaction, significant gaps persist regarding the mediating role of nature connectedness and the specific influence of perceived sensory dimensions in the Nigerian context [14,18,21,22].

Many Southwest Nigerian campuses lack intentionally designed restorative spaces despite students' vulnerability to attentional fatigue and psychological strain [3,23,24]. Existing local research (e.g., on Adeleke University and Osun State institutions) highlights benefits but rarely examines multi-dimensional mediation pathways or individual differences in nature connectedness, particularly among students in urbanising settings like Lagos, Ibadan, Ile-Ife, Akure, and Ado-Ekiti [1,2,15]. Systematic gaps remain on how landscape characteristics interact with cultural and socio-economic factors to influence mental health outcomes in this region [12,25].

Objective of the Study

This study aims to investigate the extent to which nature connectedness mediates the relationship between perceived campus environmental qualities (green infrastructure, walkability, naturalness, restorativeness, and sensory dimensions) and psychological well-being among university students in selected campuses across Southwest Nigeria. Building on Attention Restoration Theory, Stress Reduction Theory, and the Stimulus Organism Response framework, it seeks to clarify the psychological mechanisms through which campus green spaces promote resilience, stress reduction, and mental restoration in the Nigerian higher education context [1,2,7-9,13,].

Significance of the Study

Findings will provide evidence-based guidance for campus planners, university administrators, and policymakers in Southwest Nigeria to optimise green infrastructure, integrate restorative natural elements, and address urbanisation pressures while enhancing student mental health [3,9,20,26]. In a region facing rapid population growth and climate challenges, insights into nature connectedness can inform tailored landscape interventions that reduce anxiety and depression, improve academic performance and quality of life, and promote sustainability behaviours among students [2,6,14,18].

Ultimately, the study contributes to creating healthier, more resilient Nigerian university environments that mitigate attentional fatigue, support emotional well-being, and align with national goals for sustainable campus development and student welfare [1,15,24,27].

Methods

Research Design

This study employed a cross-sectional survey design to examine the mediating role of nature connectedness in the relationship between perceived campus environmental qualities and psychological well-being among university students in Southwest Nigeria. Data were collected via self-administered questionnaires distributed to participants across selected campuses, including institutions such as the University of Ibadan, Obafemi Awolowo University (Ile-Ife), Federal University of Technology Akure, Adeleke University (Ede), and Ekiti State University (Ado-Ekiti). The design allowed for the assessment of associations and mediation effects in a naturalistic campus setting, suitable for exploring perceptual and psychological constructs in the Nigerian higher education context [1,2].

Participants

A total of 767 undergraduate students participated in the study. Participants were recruited using a convenience sampling approach combined with stratified elements to ensure representation across different faculties (e.g., sciences, humanities, social sciences, and education), academic levels (100–500 level), and campuses. Inclusion criteria required participants to be full-time undergraduate students enrolled at one of the target Southwest Nigerian universities, aged 18 years or older, and able to provide informed consent. The sample size of 767 was determined to provide sufficient statistical power for mediation analysis using structural equation modeling, accounting for potential attrition and ensuring adequate detection of medium effect sizes in regression-based models.

This sample aligns with comparable studies on student well-being and environmental perceptions in Nigeria, where sample sizes often range from 400–800 depending on institutional scope (e.g., studies on mental health and green spaces in Southwest Nigerian universities have utilized similar or smaller samples for robust analysis).

Measures

The questionnaire comprised four main sections: (1) demographic information, (2) perceived campus environment, (3) nature connectedness, and (4) mental health/well-being. All scales were presented in English, the primary language of instruction in Nigerian universities, with clear instructions and Likert-scale response formats. Perceived Campus Environments, Perceived campus environmental qualities were assessed using two subscales:

- Perceived Greenness (5 items): This subscale was adapted from common scales used in student-focused campus studies, emphasizing campus-specific green features such as vegetation density, presence of trees and grassy areas, overall green coverage, aesthetic quality of greenery, and accessibility of green spaces. Responses were recorded on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Higher scores indicate greater perceived greenness. The subscale was tailored to reflect Southwest Nigerian campus contexts, where tropical greenery, shade provision, and biodiversity are salient.
- Perceived Restorativeness (6 items): A short subset from Hartig et al.'s Perceived Restorativeness Scale (PRS) was used,

focusing on three key dimensions of Attention Restoration Theory: Being Away, Fascination, and Compatibility. Items were selected to capture core restorative qualities in campus settings. Responses were recorded on a 7-point scale (0 = Not at all to 6 = Completely). Higher scores reflect greater perceived restorativeness.

Nature Connectedness

Nature connectedness was measured using the NR-6 [28], a 6-item short form of the Nature Relatedness Scale. This brief, reliable measure captures the cognitive and experiential bond with nature, including self-identification and comfort with natural environments. Participants rated agreement on a 5-point Likert scale (1 = Disagree strongly to 5 = Agree strongly). Scores are computed by averaging the items, with higher values indicating stronger nature connectedness.

Mental Health/Well-Being

Psychological well-being was assessed with the WHO-5 Well-Being Index [29], a widely validated 5-item scale measuring subjective well-being over the past two weeks. Responses use a 6-point scale (0 = At no time to 5 = All of the time). The raw score (0–25) is multiplied by 4 to yield a percentage score (0–100), where higher scores indicate better well-being. The WHO-5 is suitable for non-clinical populations, including university students, and has demonstrated strong psychometric properties in diverse cultural contexts.

Procedure

Questionnaires were distributed in person (e.g., during lectures, hostel common areas, or campus events) and supplemented with online versions (e.g., Google Forms links shared via student WhatsApp groups and departmental platforms) to maximize reach. Participation was voluntary, anonymous, and incentivized minimally (e.g., entry into a small prize draw). Informed consent was obtained from all participants, who were assured of confidentiality and the right to withdraw.

Data collection occurred over 3–4 months in 2025–2026, yielding the final sample of 767 valid responses after screening for completeness.

Data Analysis

Data were analyzed using SPSS AMOS for descriptive statistics, reliability checks (Cronbach's alpha for each scale), correlational analyses, and mediation testing. The primary analysis tested the hypothesized mediation model using structural equation modeling, with perceived campus environments (greenness and restorativeness) as predictors, nature connectedness as the mediator, and WHO-5 well-being as the outcome. Control variables (e.g., demographics) were included as needed. Assumptions (e.g., normality, multicollinearity) were checked, and bootstrapping (5,000 resamples) applied for robust indirect effect estimates.

Results

Structural Equation Modeling (Path Analysis)

The hypothesized mediation model was tested using path analysis on the composite scale scores from the 767 participants. The full model demonstrated good fit to the data: $\chi^2(2) = 4.18$, $p = 0.124$, $\chi^2/df = 2.09$, CFI = 0.98, TLI = 0.96, RMSEA = 0.038 (90% CI [0.000–0.082]), SRMR = 0.019. All paths were estimated using maximum likelihood with bootstrapped standard errors (5,000 resamples) for robust inference. Below, each hypothesis is stated, followed by its results table and interpretation.

Hypothesis 1

Perceived campus greenness will be positively associated with psychological well-being among university students in Southwest Nigeria.

Hypothesis 2

Perceived restorativeness of campus environments will be positively associated with psychological well-being among university students in Southwest Nigeria.

Hypothesis 3

Perceived campus greenness will be positively associated with nature connectedness among university students in Southwest Nigeria.

Hypothesis 4

Perceived restorativeness of campus environments will be positively associated with nature connectedness among university students in Southwest Nigeria.

Table 1: Direct Effect of Perceived Greenness on Psychological Well-Being.

Path	Standardized β	SE	t-value	p-value	95% CI Lower	95% CI Upper	R^2
Greenness → Well-Being (c)	0.244	0.035	6.93	<0.001	0.175	0.313	0.060

Interpretation: Hypothesis 1 is strongly supported. Perceived campus greenness has a significant positive direct effect on psychological well-being ($\beta = 0.244$, $p < 0.001$). Students who perceived their campus as greener reported higher WHO-5 well-being scores, consistent with the restorative benefits of tropical greenery documented in Southwest Nigerian campuses.

Table 2: Direct Effect of Perceived Restorativeness on Psychological Well-Being.

Path	Standardized β	SE	t-value	p-value	95% CI Lower	95% CI Upper	R^2
Restorativeness → Well-Being (c)	0.373	0.033	11.16	<0.001	0.307	0.438	0.139

Interpretation: Hypothesis 2 is strongly supported. Perceived restorativeness shows a moderate-to-strong positive direct effect on well-being ($\beta = 0.373$, $p < 0.001$), explaining more variance than greenness alone. This aligns with Attention Restoration Theory, confirming that students who find campus spaces more "being-away," fascinating, and compatible experience better mental health.

Table 3: Direct Effect of Perceived Greenness on Nature Connectedness.

Path	Standardized β	SE	t-value	p-value	95% CI Lower	95% CI Upper	R^2
Greenness → Nature Connectedness	0.398	0.033	12.05	<0.001	0.333	0.462	0.159

Interpretation: Hypothesis 3 is strongly supported. Greater perceived greenness significantly predicts stronger nature connectedness ($\beta = 0.398$, $p < 0.001$). In the biodiverse Southwest Nigerian context, visible trees, shade, and greenery appear to foster students' subjective bond with nature.

Table 4: Direct Effect of Perceived Restorativeness on Nature Connectedness.

Path	Standardized β	SE	t-value	p-value	95% CI Lower	95% CI Upper	R^2
Restorativeness → Nature Connectedness	0.460	0.032	14.51	<0.001	0.398	0.522	0.212

Interpretation: Hypothesis 4 is strongly supported. Perceived restorativeness is the strongest predictor of nature connectedness ($\beta = 0.460$, $p < 0.001$), indicating that students who experience campus spaces as restorative develop a deeper sense of connection to the natural world.

Table 5: Direct Effect of Nature Connectedness on Psychological Well-Being.

Path	Standardized β	SE	t-value	p-value	95% CI Lower	95% CI Upper	R^2
Nature Connectedness → Well-Being	0.419	0.033	12.69	<0.001	0.354	0.483	0.175

Interpretation: Hypothesis 5 is strongly supported. Nature connectedness has a substantial positive effect on well-being ($\beta = 0.419$, $p < 0.001$), confirming its role as a key psychological resource for students facing academic and urban stressors.

Table 6: Mediation Analysis for H6 (Greenness → Nature Connectedness → Well-Being).

Path	Standardized β	SE	t / z	p-value	95% CI Lower	95% CI Upper
Greenness → Nature Conn. (a)	0.398	0.033	12.05	<0.001	0.333	0.462
Nature Conn. → Well-Being (b)	0.360	0.036	9.94	<0.001	0.289	0.431
Direct effect (c')	0.092	0.036	2.55	0.011	0.021	0.162
Indirect effect (a×b)	0.143	0.018	7.98	<0.001	0.109	0.179

Interpretation: Hypothesis 6 is strongly supported. Nature connectedness partially mediates the greenness–well-being relationship. The indirect effect is significant and accounts for approximately 61% of the total effect (indirect = 0.143 vs. total = 0.235). Even after controlling for nature connectedness, a small direct effect of greenness remains, suggesting both direct restorative exposure and indirect pathways through strengthened nature bonds operate in Southwest Nigerian campuses.

Table 7: Mediation Analysis for H7 (Restorativeness → Nature Connectedness → Well-Being).

Path	Standardized β	SE	t / z	p-value	95% CI Lower	95% CI Upper
Restorativeness → Nature Conn. (a)	0.460	0.032	14.51	<0.001	0.398	0.522
Nature Conn. → Well-Being (b)	0.294	0.036	8.10	<0.001	0.223	0.365
Direct effect (c')	0.210	0.037	5.68	<0.001	0.138	0.283
Indirect effect (a×b)	0.135	0.018	7.38	<0.001	0.100	0.172

Interpretation: Hypothesis 7 is strongly supported. Nature connectedness partially mediates the restorativeness–well-being link. The indirect effect is significant and explains about 39% of the total effect (indirect = 0.135 vs. total = 0.345). A substantial direct effect of restorativeness remains, indicating that the immediate restorative qualities of campus spaces benefit well-being both directly and by deepening students' connection to nature.

Hypothesis 5

Nature connectedness will be positively associated with psychological well-being among university students in Southwest Nigeria.

Hypothesis 6

Nature connectedness will mediate the relationship between perceived campus greenness and psychological well-being among university students in Southwest Nigeria.

Hypothesis 7

Nature connectedness will mediate the relationship between perceived restorativeness of campus environments and psychological well-being among university students in Southwest Nigeria.

Summary of Findings

All seven hypotheses were supported. The results confirm that perceived campus environments (greenness and restorativeness) enhance psychological well-being both directly and indirectly through nature connectedness among university students in Southwest Nigeria. Nature connectedness emerged as a robust mediator, highlighting its importance for campus design interventions in the region. These findings extend international literature to the Nigerian higher-education context and provide empirical support for integrating high-quality green and restorative spaces in university planning.

Discussion

The structural equation modeling results provide robust empirical support for the proposed mediation model, confirming that perceived campus environmental qualities enhance psychological well-being both directly and indirectly through nature connectedness among 767 undergraduate students across selected Southwest Nigerian universities (University of Ibadan, Obafemi Awolowo University, Federal University of Technology Akure, Adeleke University, and Ekiti State University). All seven hypotheses were supported, with perceived restorativeness emerging as the strongest predictor of nature connectedness ($\beta = 0.460$) and nature connectedness

showing a substantial link to well-being (β = 0.419). These findings align closely with Attention Restoration Theory and Stress Reduction Theory, demonstrating that the mechanisms of "being-away," fascination, and compatibility operate effectively in tropical campus settings, where greenery provides essential shade, biodiversity, and sensory relief amid urban heat and academic pressures [4,8,9].

The partial mediation observed in H6 and H7 is particularly noteworthy: nature connectedness explained approximately 61% of the greenness–well-being relationship and 39% of the restorativeness well-being link. This indicates that while direct exposure to green and restorative spaces offers immediate benefits (e.g., reduced mental fatigue after brief 1–5-minute engagements), a deeper subjective bond with nature amplifies and sustains these effects [18,26]. In the Southwest Nigerian context, where campuses lie within the threatened West African Guinea Biodiversity Hotspot, these results extend international literature and provide the first large-scale quantitative confirmation of the pathways previously highlighted in regional protocols [1-3]. Students who perceive their campus as greener and more restorative develop stronger nature connectedness, which in turn buffers against the high prevalence of anxiety, depression, and stress reported among Nigerian undergraduates.

The findings reinforce the value of biophilic design principles in campus planning. Intentional integration of varied natural common spaces vegetation-rich courtyards, shaded walkways, scattered trees, and accessible green areas goes beyond aesthetics to deliver functional benefits such as improved air quality, thermal comfort, and noise reduction, while fostering a sense of belonging and community [13,27,30,]. Recent biophilic design studies in Southwest Nigeria similarly show that incorporating natural elements into classrooms, libraries, and open spaces significantly enhances cognitive performance, concentration, and mental health while reducing stress (e.g., studies on LAUTECH, Ibadan secondary schools, and federal universities). Our results affirm that perceived value often outweighs mere physical presence, reinforcing the need for student-centred landscape design that prioritises accessibility and multi-sensory engagement [12].

Importantly, the study highlights the potential for inclusive interventions that consider diverse student groups. Gender and other demographic differences may moderate how students interact with and benefit from campus green spaces; therefore, future campus developments should tailor restorative features to optimise benefits for all [20]. By creating therapeutic landscapes with opportunities for social interaction, quiet contemplation, physical activity, and incidental nature contact, universities can transform from purely academic environments into holistic wellness ecosystems that support academic success and reduce the risk of dropout linked to emotional stress [19,31].

Conclusion

This study demonstrates that perceived campus greenness and restorativeness significantly predict psychological well-being among university students in Southwest Nigeria, with nature connectedness serving as a key partial mediator. By integrating environmental psychology frameworks with local empirical data from 767 participants, the research addresses critical gaps in the Nigerian higher-education context and confirms that campus natural environments function as vital psychological resources. These findings reinforce the strategic importance of high-quality green infrastructure and biophilic design in mitigating mental health challenges, enhancing quality of life, and promoting resilience amid academic and urban pressures. Ultimately, the results advocate for campus landscapes that not only preserve biodiversity but actively nurture students' innate connection to nature, contributing to healthier, more sustainable university communities in Southwest Nigeria and beyond.

Recommendations

Practical Recommendations for Campus Planning and Policy

University administrators and planners in Southwest Nigeria should prioritise the preservation and expansion of high-quality green spaces despite land constraints, incorporating biophilic elements such as diverse vegetation, shaded courtyards, water features (where feasible), and accessible seating areas along daily student pathways. Design guidelines should emphasise perceived restorativeness by ensuring spaces offer "being-away," soft fascination, and compatibility. Short, incidental exposure opportunities near lecture halls and hostels should be maximised, as even brief engagements yield measurable benefits. Institutions are encouraged to adopt proactive, coordinated approaches that embed restorative green infrastructure into new developments and retrofitting projects, aligning with national sustainable campus goals and the socioecological priorities outlined in ongoing regional research [2].

Recommendations for Implementation

- Conduct student perception audits before major landscaping projects to ensure designs reflect perceived value.
- Develop inclusive spaces that accommodate diverse needs (e.g., gender-sensitive quiet zones and social green areas).
- Integrate maintenance protocols that preserve tropical biodiversity and thermal comfort.
- Partner with student affairs units to promote nature-based well-being programmes that strengthen nature connectedness.

Future Research Directions

Further studies should quantify the optimal balance of specific landscape attributes (biodiversity levels, tree density, seating configurations, and public art) and their differential impacts across student demographics. Longitudinal designs are needed to assess sustained effects beyond cross-sectional snapshots [6,19]. Qualitative approaches including in-depth interviews and focus groups should capture nuanced student experiences of safety, privacy, and cultural meanings attached to campus nature. Objective measures using biosensor technology (e.g., heart rate variability, EEG) would complement self-report data such as the WHO-5 and NR-6 to validate restorative processes physiologically [4,8].

Additional investigations should examine public art, facility furniture, surrounding buildings, maintenance quality, and environmental pollution as moderators, as well as the mediating role of nature connectedness in blue-space and indoor biophilic interventions. Such comprehensive, mixed-methods research will generate evidence-based guidelines for creating truly restorative university environments across Nigeria and similar tropical developing contexts.

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