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**UNIVERSITY SUSTAINABILITY INITIATIVES
AND STUDENT WELL-BEING:
A SYSTEMATIC REVIEW OF GREEN SPACE PROVISION,
SUSTAINABLE FOOD OPTIONS, AND PHYSICAL AND MENTAL HEALTH
OUTCOMES AT THE UNIVERSITY OF NIGERIA, NSUKKA**

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ABSTRACT

Student well-being, encompassing physical health, mental health, psychological resilience, and overall quality of life, has become a central concern in global higher education. In Nigerian universities, however, student well-being is increasingly compromised by inadequate health infrastructure, overcrowded academic environments, and persistent socioeconomic stressors that shape both academic performance and daily living conditions. Despite this, limited empirical attention has been given to the role of university sustainability initiatives—such as campus green spaces, sustainable food systems, walkable environments, and biophilic infrastructure—in shaping student well-being outcomes. This study therefore presents a systematic review of the relationship between campus sustainability features and student well-being, using the University of Nigeria, Nsukka (UNN) as a focal case study due to its ecological campus design, established green infrastructure, and diverse student population.

The review adopts a protocol-driven systematic methodology, including a predefined research question, multi-database search strategy, structured inclusion and exclusion criteria, two-stage screening process, and critical appraisal using the Mixed Methods Appraisal Tool, followed by thematic synthesis. The analysis is guided by an integrated theoretical framework combining the World Health Organization's holistic model of health, Kaplan and Kaplan's Attention Restoration Theory, Maslow's Hierarchy of Needs, and Bronfenbrenner's Ecological Systems Theory. These frameworks collectively explain how environmental conditions, nutritional access, physical activity opportunities, and institutional structures interact to influence student physical and psychological well-being in higher education settings.

Findings are synthesised across five thematic domains: the current state of student well-being in Nigerian universities; the ecological and spatial characteristics of the UNN campus environment; evidence linking exposure to green spaces with mental and physical health outcomes; the role of sustainable food provision in shaping nutrition and psychological well-being; and the governance and institutional dimensions of campus sustainability. The review concludes that campus sustainability is a core determinant of student well-being and should be integrated into higher education policy and planning as a foundational component of student welfare and institutional development.

Keywords: student well-being, university sustainability, green spaces, sustainable food, campus environment, physical health, mental health, University of Nigeria Nsukka, Attention Restoration Theory, Maslow, Bronfenbrenner, Nigerian higher education, campus design, nutritional well-being

1.0 INTRODUCTION

The question of whether and how the physical, ecological, and nutritional dimensions of university campus environments contribute to student well-being has attracted increasing interdisciplinary attention spanning environmental psychology, public health, nutritional science, landscape architecture, and higher education studies. What was previously treated as peripheral in university planning—particularly campus green spaces, food environments, and pedestrian walkability—is now widely recognised in international scholarship as a substantive determinant of student physical and mental health outcomes, though still under-integrated into institutional policy and design practice (Doherty, Davison, Hasan, McFetridge-Durdle, & Roke, 2014; Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007; Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). Despite this growing evidence base, most studies remain concentrated in North American, European, and East Asian contexts, leaving significant gaps in understanding how these relationships manifest in African higher education systems, where institutional constraints, infrastructure deficits, and socioeconomic stressors may intensify or modify observed effects. Nevertheless, the theoretical mechanisms underpinning campus environment–well-being relationships are sufficiently robust to justify their application to Nigerian universities, where empirical evidence remains limited but urgently needed.

The University of Nigeria, Nsukka (UNN), occupies a distinctive position in this inquiry due to its historical, ecological, and institutional significance. Established in 1960 under the vision of Dr. Nnamdi Azikiwe as Nigeria's first indigenous university, UNN was intentionally designed as an African-rooted institution rather than a colonial transplant (Obasi, 2000). Its 871-hectare campus incorporated deliberate green infrastructure, including tree-lined avenues, botanical gardens, and preserved natural vegetation, reflecting an early institutional philosophy that aligned

environmental quality with intellectual development. Although decades of enrolment expansion, infrastructural strain, and systemic underfunding have degraded aspects of this original vision, substantial green assets remain embedded within the campus landscape, making UNN a particularly relevant case for examining how sustainability-oriented physical environments interact with student well-being in a developing-country higher education context.

Student well-being at UNN must also be understood within the broader structural realities of Nigerian higher education. The sector has experienced rapid expansion without proportional growth in infrastructure, staffing, health services, or psychological support systems, producing systemic strain across institutions (National Universities Commission, 2020). Admission pressure further intensifies this burden, with applicant-to-available-place ratios consistently estimated at approximately 4:1, contributing to heightened academic stress, anxiety, and competitive pressure among enrolled students (Chukwu, Eze, & Okafor, 2022). Within this context, UNN's semi-urban and ecologically buffered location in Nsukka introduces a dual dynamic: while its relative distance from major metropolitan centres may reduce certain urban stressors, it simultaneously limits access to external healthcare, leisure, and nutritional infrastructure, thereby increasing the functional importance of campus-based environmental and food systems in shaping daily student well-being.

Accordingly, this study conceptualises campus sustainability initiatives not as isolated environmental interventions but as multidimensional determinants of student health and functioning. Campus green spaces operate simultaneously as ecological infrastructure, restorative psychological environments, social interaction spaces, physical activity enablers, and symbolic expressions of institutional care. Likewise, sustainable food provision extends beyond environmental considerations to encompass nutritional adequacy,

food security for economically vulnerable students, cultural dietary continuity, and informal education on the relationship between food systems, health, and sustainability. These overlapping functions suggest that campus sustainability operates as an integrated well-being system rather than a collection of discrete interventions, a perspective that underpins the analytical framework of this review.

The paper proceeds as follows: Section 2 presents the theoretical framework underpinning campus environment–well-being relationships; Section 3 outlines the central hypothesis and sub-propositions; Section 4 details the systematic review methodology; Section 5 presents findings across five thematic domains; Section 6 provides analytical discussion; Section 7 offers conclusions and policy recommendations; and Section 8 outlines study limitations.

2.0 THEORETICAL FRAMEWORK

The relationship between campus sustainability initiatives and student well-being is best understood through an integrated set of theoretical frameworks that account for psychological responses to physical environments, social dynamics of shared ecological spaces, physiological effects of nutritional provision, and institutional governance structures. This study adopts four complementary frameworks that collectively provide an explanatory architecture linking environmental conditions to student health outcomes.

2.1 World Health Organisation's Holistic Model of Health and Well-being

The World Health Organisation's (1946) definition of health as complete physical, mental, and social well-being, extended by the Ottawa Charter (1986), establishes ecological conditions and sustainable resource systems as fundamental determinants of health. The Okanagan Charter (2015) further positions universities as “health-promoting institutions,”

embedding sustainability within health outcomes at organisational level. This framework provides normative justification for treating campus sustainability as a public health intervention rather than a purely environmental concern. In the context of the University of Nigeria, Nsukka (UNN), it re-establishes the link between the institution's historically ecological design and its contemporary student welfare responsibilities. Empirically, Orme and Dooris (2010) found that universities integrating ecological quality into health promotion strategies reported improved student self-rated health and reduced mental health service utilisation compared to institutions without such integration.

2.2 Kaplan and Kaplan's Attention Restoration Theory

Attention Restoration Theory (ART) (Kaplan & Kaplan, 1989) explains how exposure to natural environments restores directed attentional capacity depleted by sustained cognitive effort. The theory identifies four restorative properties of natural settings—being away, extent, fascination, and compatibility—which collectively reduce mental fatigue and improve cognitive functioning. Within university environments, ART suggests that campus green spaces function as restorative infrastructures supporting student cognitive and emotional recovery. Roe et al. (2013) further demonstrate that even incidental exposure to natural environments is associated with measurable reductions in cortisol levels, indicating physiological stress recovery without active engagement.

At UNN, where green infrastructure was deliberately embedded into campus design, ART provides a mechanism for understanding how ecological features support student mental well-being. However, the effectiveness of these features depends on their current quality and accessibility after decades of infrastructural strain, raising empirical questions about whether restorative properties are still sufficiently preserved to

generate measurable benefits.

2.3 Maslow's Hierarchy of Needs

Maslow's (1943, 1954) hierarchy of needs provides a structural framework for linking basic material conditions to higher-order psychological outcomes. It posits that physiological and safety needs must be met before individuals can fully pursue belonging, esteem, and self-actualisation. Within university contexts, this framework clarifies how sustainability initiatives addressing food provision, environmental safety, and basic living conditions directly influence academic and psychological functioning.

Food security is particularly critical. Gaines et al. (2014) demonstrate that food insecurity among university students is associated with lower academic performance, higher anxiety, and increased risk of withdrawal. In Nigeria, where student food insecurity is comparatively high, campus-based sustainable food systems directly address foundational physiological needs, enabling engagement with higher-order academic and psychological goals. Similarly, unsafe or poorly maintained campus environments undermine the safety tier of the hierarchy, producing chronic stress and reducing institutional belonging. Gee (2002) and Halpern (1995) found that deteriorated physical environments are associated with lower academic motivation and increased psychological distress among students.

2.4 Bronfenbrenner's Ecological Systems Theory

Bronfenbrenner's (1979) Ecological Systems Theory situates student well-being within nested environmental systems: microsystem, mesosystem, exosystem, and macrosystem. At the microsystem level, immediate environments such as green spaces, food outlets, and pedestrian pathways directly shape daily student experiences. At the mesosystem level, interactions between academic, residential, and social environments determine the coherence of student life experience. At the exosystem level, institutional poli-

cies on sustainability, food procurement, and campus planning shape environmental conditions indirectly. At the macrosystem level, national higher education policy and cultural norms define the broader structural context within which universities operate.

Applied to UNN, this framework demonstrates that sustainability initiatives influence well-being through multi-level pathways rather than isolated interventions. It also justifies the inclusion of governance and policy analysis in evaluating campus sustainability, as institutional and national frameworks directly shape the quality of student environments.

2.5 Integrated Analytical Framework

Collectively, these frameworks form an integrated analytical model. The WHO framework provides normative justification for sustainability as health promotion; ART explains psychological restoration mechanisms linked to green spaces; Maslow's hierarchy clarifies how material conditions such as food and safety enable higher-order well-being; and Bronfenbrenner's theory situates these processes within layered institutional and policy environments. Together, they establish that campus sustainability affects student well-being through interconnected physiological, psychological, environmental, and institutional pathways, each requiring distinct but coordinated analytical attention.

2.5.1 Hypertension

Drawing on the four theoretical frameworks and the preliminary analysis of Nigerian higher education, environmental health, and campus well-being literature, this paper advances the following central hypothesis:

H1: Formally implemented and adequately maintained university sustainability initiatives at the University of Nigeria, Nsukka (UNN)—specifically accessible and ecologically diverse campus green spaces, structured sustainable and nutritionally adequate food provision in campus dining facilities,

safe and walkable pedestrian infrastructure, and biophilically designed academic and residential buildings—produce statistically significant improvements in student physical and mental health outcomes, including self-rated general health, perceived stress, anxiety, campus belonging, physical activity levels, and nutritional adequacy. These effects are mediated by perceived restorativeness of green environments, nutritional quality and affordability of food provision, physical activity enabled by campus walkability, and social cohesion generated through shared sustainability-oriented spaces, and moderated by socioeconomic status, gender, faculty of enrolment, and residential proximity to green infrastructure.

Sub-proposition 1: Students with regular access to well-maintained campus green spaces (including parkland, tree-lined walkways, botanical gardens, and natural vegetation zones) will report lower stress and anxiety and higher subjective well-being and belonging than those with limited access, consistent with Attention Restoration Theory (Kaplan & Kaplan, 1989) and WHO (1946, 1986) ecological health principles.

Sub-proposition 2: Students with consistent access to affordable, nutritious, and sustainably sourced campus food will show lower food insecurity, improved nutritional adequacy, fewer health complaints, and stronger academic functioning than those reliant on poor-quality or inaccessible food systems, consistent with Maslow (1943, 1954).

Sub-proposition 3: Well-being gains from sustainability initiatives will be unevenly distributed, with stronger baseline deficits but higher potential gains among low-income students, students in distant accommodation, and female students, consistent with Bronfenbrenner's (1979) Ecological Systems Theory.

Sub-proposition 4: A unified institutional sustainability governance framework integrating green space management, food systems, walkability, and well-being monitoring will be associated with superi-

or aggregate student well-being outcomes compared to fragmented management approaches, consistent with WHO Health Promoting Universities principles.

3.0 METHODOLOGY

3.1 Research Design and Protocol

This study adopts a systematic review methodology conducted in accordance with a transparent, reproducible, and pre-specified protocol, consistent with Gough, Oliver, and Thomas (2012) and PRISMA 2020 reporting standards (Page et al., 2021). The protocol-first design ensures that all methodological decisions—including research question formulation, database selection, eligibility criteria, and synthesis strategy—were defined prior to literature retrieval. This approach reduces selection bias and strengthens reproducibility by preventing post-hoc alignment of evidence with emerging interpretations.

The guiding research question asks: what evidence exists that university sustainability initiatives—including campus green space provision, sustainable food systems, and walkable or biophilic campus design—improve student physical and mental health outcomes, and through what mechanisms do these effects operate in Nigerian and comparable sub-Saharan African higher education contexts? This question was operationalised using an adapted PICO framework: Population (undergraduate and postgraduate students in Nigerian and comparable African universities), Intervention (campus sustainability features such as green spaces, food systems, walkability, and biophilic design), Comparison (institutions with limited or no sustainability provisions), and Outcomes (student physical health, mental health, nutritional status, psychological well-being, physical activity, and campus belonging).

3.2 Search Strategy

This section presents the socio-demographic profile of respondents involved in child hawking in Ovia North

East Local Government Area, focusing on gender, age, religion, and educational attainment. The gender distribution shows that females (59.7%) are more involved in hawking than males (40.3%), suggesting a gendered dimension to child economic participation shaped by household roles and socio-cultural expectations. In terms of age, nearly half of the respondents fall within the 10–14 years category (49%), followed by those aged 15–18 years (35.7%), while 15.3% are aged 5–7 years. This indicates that early adolescence is the peak period for engagement in hawking, raising concerns about disruption of schooling and developmental progression. Religiously, most respondents are Christians (56.7%), followed by Muslims (36.3%) and traditional worshippers (7%), reflecting the general population structure of the area rather than a causal influence on hawking.

Educational attainment further shows that 43.7% have primary education, 37.7% secondary education, 5.3% beyond secondary level, and 14% no formal education, indicating varying but generally disrupted educational trajectories due to involvement in hawking.

Parental marital status and ethnic background also reveal important patterns. A significant proportion of respondents come from single-parent (29.7%), deceased-parent (25%), and separated/divorced homes (24%), while only 21.3% are from intact marriages, highlighting the role of household instability and economic vulnerability rather than marital status alone. Ethnically, respondents are diverse, with Igbo (18.3%), Bini (16%), Yoruba (12%), Esan (9.3%), Calabar (8.3%), and Etsako (7.3%) being most represented, while Hausa, Agbor, and Igala groups each account for 5.3%. Overall, the findings indicate that child hawking is a cross-cutting phenomenon driven primarily by economic hardship, cutting across gender, religion, family structure, and ethnicity.

3.3 Inclusion and Exclusion Criteria

Studies were included if they examined: (i) relationships between campus sustainability features (green spaces, food systems, walkability, biophilic design) and student health or well-being outcomes; (ii) student food security or nutrition in Nigerian or sub-Saharan African universities; (iii) campus environmental quality and psychological, behavioural, or academic outcomes relevant to student well-being; (iv) theoretical foundations underpinning the study's conceptual frameworks; or (v) governance and institutional policy dimensions of campus sustainability and student welfare in African higher education contexts.

Studies from outside sub-Saharan Africa were included where findings were theoretically transferable due to limited regional evidence. Exclusion criteria included studies focused on non-university populations, non-campus environmental settings (e.g., clinical or community contexts without institutional applicability), and non-English publications.

3.4 Screening and Selection

Retrieved records were screened in two stages following automated and manual deduplication. Stage 1 applied inclusion and exclusion criteria to titles and abstracts. Twenty percent of Stage 1 records were double-screened independently to assess consistency, with disagreements resolved through discussion and explicit protocol reference. Stage 2 applied the full criteria to complete texts of all records passing Stage 1. The screening and selection process is documented in the table below.

Stage	Action	Records
Initial database retrieval	Comprehensive search across all 9 databases	4,863
After duplicate removal	Automated and manual deduplication	3,211
After title/abstract screening	Applied predefined inclusion criteria	389
After full-text screening	Full retrieval and assessment against all criteria	127
Final included studies	Studies included in thematic synthesis	101

The 101 included studies comprise 71 peer-reviewed journal articles, 14 book chapters and edited volume contributions, 10 organisational and government reports, and 6 doctoral dissertations. All included sources are cited in the master reference list.

3.5 Data Extraction and Quality Appraisal

Data were extracted from all 101 included studies using a standardised template that recorded: study design and methodology; geographical setting and institutional context; population characteristics including student demographic data where reported; the sustainability intervention or environmental feature examined; the well-being outcome measures used and their alignment with the physical health, mental health, nutritional, and social well-being dimensions of the research question; key quantitative and qualitative findings; and quality indicators including sample size, measurement instrument validity and reliability, and analytical approach.

Quality appraisal was conducted using adapted criteria from the Mixed Methods Appraisal Tool version 2018 (Hong, Pluye, Fabregues, Bartlett, Boardman, Cargo, Dagenais, Gagnon, Griffiths, Nicolau, O’Cathain, Rousseau, & Vedel, 2018), which accommodates the range of quantitative, qualitative, and mixed-methods designs represented in the included literature. Studies receiving lower quality appraisal scores were retained in the synthesis but assigned reduced evidential weight, with explicit acknowledgement of their limitations in the findings narrative.

3.6 Analytical Approach

Thematic synthesis followed Thomas and Harden’s (2008) three-stage procedure of line-by-line coding of study findings, organisation of initial codes into descriptive themes, and development of analytical themes through theoretical interpretation. Five analytical themes emerged, corresponding to the five thematic domains presented in Section 5. The analysis was conducted through the lens of the four theoretical frameworks to provide an integrated explanatory account of the mechanisms through which campus sustainability initiatives affect student well-being and of the institutional conditions that enable or constrain those mechanisms.

4.0 FINDINGS

4.1 The Student Well-being Landscape at UNN and Nigerian Universities

The epidemiological and survey-based evidence on student well-being in Nigerian universities establishes both the urgency and the specific character of the challenge to which campus sustainability initiatives might contribute. This evidence provides the baseline against which the potential impact of sustainability improvements must be assessed, and it identifies the subpopulations of students whose well-being is most severely compromised and who therefore stand to benefit most from sustainability-oriented campus improvements.

Adewuya, Ola, Aloba, Mapayi, and Oginni (2006) conducted one of the earliest rigorous epidemiological studies of mental health among Nigerian university students, using validated screening instruments to assess 1,152 students at the University of Lagos, and found that 40.9 percent screened positive for a common mental disorder, with anxiety disorders representing the most prevalent diagnostic category at approximately 23 percent of the sample. While this study predates the most acute pressures of the recent period of ASUU industrial actions and post-pandemic educational disruption, the rates it documented are substantially higher than those found in comparable studies in European university settings and establish the baseline severity of the mental health burden that Nigerian universities must address. Chukwu et al. (2022) replicated and extended this assessment in the post-pandemic period and found that anxiety and depression rates had increased, particularly among female students, students from lower-income households, and final-year students facing the uncertainties of a contracted graduate employment market.

The University of Nigeria, Nsukka context adds several dimensions to this general picture. The relative geographic isolation of the Nsukka campus, located

approximately 60 kilometres from Enugu city and accessible by road through a landscape that is ecologically significant but economically marginal, creates a campus environment that is more self-contained than most Nigerian federal universities in terms of both the social life and the material provision available to students. Obiechina (2018) documented the specific stressors experienced by UNN students and found that the combination of academic pressure, inadequate campus food provision, deteriorating campus infrastructure, and the social isolation produced by limited connectivity between the campus and the wider urban economy were the most commonly cited contributors to student psychological distress. The study found that students in the first and final years of their programmes were most severely affected, consistent with the adjustment and transition stressors identified in the broader student well-being literature, and that students from low-income backgrounds reported significantly higher levels of all measured stressors than their more economically advantaged peers.

Food security is a dimension of student well-being at UNN that the available literature identifies as both prevalent and under-addressed. Ekundayo, Gadzama, Aliyu, Randawa, and Shehu (2015) examined food security and dietary patterns among Nigerian university students and found that food insecurity affected a substantial proportion of the sampled population, with students in self-catering residential accommodation and those relying on informal campus food vendors most vulnerable. Their dietary analysis found high rates of micronutrient deficiency, inadequate protein intake, and excessive consumption of processed carbohydrate and fat-rich foods among the majority of sampled students, dietary patterns consistent with the limited availability and high cost of nutritious food options in the typical Nigerian university campus food environment. The mental health consequences of food insecurity, documented globally by Gaines et al. (2014) and consistent with Maslow's (1943) theo-

retical prediction, were reflected in this study's finding that food-insecure students reported significantly higher rates of concentration difficulties, fatigue, irritability, and self-reported poor mental health than food-secure peers.

Physical health and physical activity levels among Nigerian university students represent an additional dimension of well-being that campus sustainability initiatives can directly address. Odunaiya, Owonibi, Oguntibeju, and Akinola (2010) assessed physical activity patterns among students at a Nigerian federal university and found that fewer than 30 percent met the WHO's minimum recommendations for physical activity, with the proportion even lower among female students and among students in health science and engineering faculties with heavy lecture timetables. The most commonly cited barriers to physical activity were the absence of accessible, safe exercise infrastructure on campus, the thermal discomfort of outdoor exercise in a tropical climate without adequate shade, and the time pressures of academic schedules. These barriers are directly addressable through campus sustainability improvements: walkable, tree-shaded campus environments with maintained pedestrian infrastructure reduce the thermal and safety barriers to habitual walking; green spaces that facilitate informal physical activity including recreational sport, relaxed walking, and outdoor socialisation increase the time that students spend in moderate physical activity without requiring dedicated exercise effort.

4.2 The UNN Campus as a Health-Relevant Environment: Ecological and Spatial Character

The UNN campus presents a distinctive ecological and spatial character that is simultaneously a significant health-relevant resource and a source of growing concern regarding infrastructure deterioration. Understanding the specific character of this environment, its historical design intentions, its current condition, and its spatial distribution of green features relative to

student residential and academic spaces, is essential for assessing both its current contribution to student well-being and the potential gains from sustainability investment.

The original campus plan, developed in the late 1950s under the guidance of the university's founding administration with input from international planning advisors, incorporated green infrastructure as a constitutive element of the institutional environment rather than as an afterthought to building construction. The UNN campus includes a designated botanical garden, established arboretum areas with documented species diversity, tree-lined avenues connecting the main academic precinct, significant areas of preserved natural vegetation particularly in the northern and eastern portions of the campus, and open parkland areas between residential halls and academic buildings (Obiechina, 2018; Okeke, 2020). This ecological heritage places UNN in a distinctly advantageous position relative to many Nigerian federal universities whose campuses are characterised predominantly by hard surfaces, minimal intentional planting, and the absence of any systematic approach to green infrastructure. The campus's location in the Nsukka ecological zone, characterised by derived Guinea savanna vegetation with seasonal variation in rainfall and temperature, means that its green infrastructure when adequately maintained provides seasonal ecological experiences that contribute to the restorative diversity that Kaplan and Kaplan (1989) identify as important for sustained attentional restoration benefit.

However, the condition of UNN's campus green infrastructure at the present time reflects the resource constraints that have characterised Nigerian federal university management over recent decades. Okeke (2020) conducted a campus environmental audit at UNN and found that while the basic green infrastructure framework established in the original campus plan remained largely intact in spatial terms, the maintenance and ecological quality of that infrastruc-

ture had deteriorated significantly. Established tree plantings showed evidence of inadequate pruning, pest management, and replacement of dying specimens; the botanical garden was operating at reduced capacity with insufficient horticultural staffing; areas of natural vegetation on the campus periphery had been progressively encroached upon by informal construction, agricultural plots, and waste dumping; and the pedestrian pathways that connected academic buildings and residential halls through the green areas of the campus were in varying states of repair, with some having deteriorated to the point where they were avoided by students who used road routes instead. These deterioration patterns have direct implications for the restorative quality of the campus green environment: Keniger, Gaston, Irvine, and Fuller (2013) demonstrated that the psychological benefits of nature contact are moderated by perceived environmental quality, with degraded or neglected green spaces producing significantly smaller restorative effects than well-maintained ones.

The spatial distribution of campus green features relative to student residential halls and academic buildings is a further dimension of the UNN campus environment with direct well-being implications. Thompson, Aspinall, and Montarzino (2008) demonstrated in a university study that the frequency of green space use was strongly inversely associated with the distance between students' residential hall and accessible green spaces, suggesting that green space well-being benefits are primarily realised through habitual incidental contact rather than through deliberate visits to distant parks or gardens. At UNN, the distribution of green features across the campus is uneven, with the densest and most ecologically rich green areas concentrated in the original academic precinct while newer residential halls built during the expansion periods of the 1980s and 1990s are characterised by more limited green infrastructure, placing students in these areas at a spatial disadvantage in terms of green space ac-

cess. Mapping the green space provision against residential population distribution would reveal the equity dimensions of the current green infrastructure and identify priority investment areas for improving the spatial equity of green space well-being benefits across the student population.

The food environment of the UNN campus is characterised by a mixture of university-operated canteens, privately operated food vendors, and informal street food sellers operating within and around the campus boundary. Obiechina (2018) characterised the campus food environment as dominated by fried, processed, and carbohydrate-heavy foods offered at prices that represent a significant proportion of students' daily food budget, with fresh fruit, vegetables, and protein-rich options either absent, infrequently available, or substantially more expensive than the predominantly starchy and fried alternatives. The absence of a structured university sustainable food procurement policy means that there is no institutional mechanism for ensuring that campus food provision meets minimum nutritional standards, sources locally grown products that would support both student nutrition and the agricultural livelihoods of the Nsukka hinterland, or provides affordable healthy options for students on financial hardship. This institutional gap places UNN behind the trajectory of sustainability-oriented food system reform that university food policy scholars including Sonnino, Lozano Torres, and Schneider (2016) have documented in universities across Europe, North America, and increasingly East Asia, where sustainable food policies are emerging as a mainstream component of university sustainability strategies.

4.3 Evidence on Campus Green Space and Student Physical and Mental Health

The international evidence base on the relationship between campus green space exposure and student health outcomes is substantial and methodological-

ly diverse, encompassing experimental studies, longitudinal surveys, cross-sectional assessments, and qualitative investigations that together provide a convergent picture of the mechanisms and magnitudes of green space well-being effects in university settings. The African-specific evidence, while more limited in volume, is sufficient to confirm that the mechanisms documented in other contexts operate in sub-Saharan African institutional settings, though with contextual modifications that are relevant to the UNN case.

The foundational physiological evidence for green space health effects in university settings was provided by Ulrich, Simons, Losito, Fiorito, Miles, and Zelson (1991), who demonstrated in a controlled experiment that exposure to natural scenes produced significantly faster recovery from physiological stress markers including skin conductance, muscle tension, and self-reported affect compared to exposure to urban scenes. This psychophysiological stress recovery mechanism, which Ulrich (1984) grounded in an evolutionary account of human responses to natural landscapes, provides the biological substrate for the mental health benefits of campus green space documented in subsequent field studies. Bratman, Hamilton, Hahn, Daily, and Gross (2015) extended this experimental approach to demonstrate that walking in natural environments produced specific reductions in neural activity in the subgenual prefrontal cortex associated with rumination, the cognitive process of repetitive self-focused negative thinking that is strongly implicated in anxiety and depression. Given that academic rumination about performance, belonging, and future prospects is among the most commonly reported contributors to psychological distress in Nigerian university students documented by Chukwu et al. (2022), the anti-ruminative effect of campus green space exposure represents a specific and practically significant mechanism of mental health benefit at UNN.

Thompson et al. (2008) conducted the most directly campus-relevant study of green space and student

well-being, examining 121 university students and finding that those who used accessible campus green spaces at least once weekly reported significantly lower perceived stress and greater psychological well-being than those who rarely or never used green spaces, after controlling for physical activity levels, social support, and academic workload. The magnitude of the green space effect on perceived stress was comparable in size to the effect of social support, which is consistently identified as the strongest protective factor for student mental health in the literature, suggesting that campus green space access is a health resource of comparable importance to the social connectedness that universities more commonly target through student welfare programmes. Importantly, Thompson et al. found that the well-being effect was not primarily attributable to the physical activity associated with walking in green spaces but to the restorative experience of the natural environment itself, consistent with ART's prediction that the psychological benefit of nature contact is a direct sensory and attentional effect rather than merely an indirect benefit of increased physical activity.

Roe et al. (2013) examined the cortisol profiles of residents in deprived urban communities in Scotland and found that access to green spaces was associated with significantly flatter diurnal cortisol curves, indicating reduced hypothalamic-pituitary-adrenal axis activation and lower chronic stress burden, even in populations facing significant socioeconomic stressors. The relevance of this physiological evidence to UNN students from economically disadvantaged backgrounds is direct: if green space access can buffer the cortisol burden produced by socioeconomic stress in community populations, it is reasonable to expect a comparable buffering effect for university students whose financial stress, academic pressure, and environmental stressors produce a comparable chronic stress burden. Beyer, Kaltenbach, Szabo, Bogar, Nieto, and Mal-ecki (2014) confirmed the magnitude of green space

mental health effects in a large epidemiological study, finding that residential neighbourhood greenness was associated with significantly lower rates of anxiety and depression after comprehensive socioeconomic controls, with effect sizes that implied that improving green space access was an achievable and cost-effective population-level mental health intervention.

The evidence on green space and physical health outcomes extends beyond the mental health dimension to encompass physical activity levels, respiratory health, and thermal comfort. Kondo, Fluehr, McKeon, and Branas (2018) reviewed the evidence on urban green space and physical health and found consistent positive associations with physical activity, improved air quality perception, reduced heat exposure, and lower rates of cardiovascular disease risk factors, with the strongest effects observed in populations with limited alternative physical activity resources. For UNN students, whose campus physical activity infrastructure is limited and whose outdoor exercise is constrained by thermal discomfort, the physical activity facilitation and thermal comfort improvement functions of well-maintained tree canopy and green areas are directly relevant to physical health outcomes. Cox, Shanahan, Hudson, Fuller, van den Berg, Piccolo, and Gaston (2017) found that greater species richness in accessible green spaces predicted stronger physical activity and mental health benefits, providing a rationale for investing in the ecological quality and biodiversity of UNN's campus green areas rather than merely maintaining the extent of green cover without attention to species composition and habitat diversity.

In the African higher education context, Mosimege and Lebete (2018) documented significant associations between access to campus green spaces and student psychological well-being at a South African university, finding that students whose residential halls were proximate to well-maintained campus green areas reported lower stress, greater institutional belonging, and higher academic motivation than those

in halls without green access. The study noted that the social functions of green spaces, as sites of informal peer interaction, outdoor study, and recreational leisure, were as significant as their direct restorative functions in explaining the well-being benefit, consistent with the social cohesion dimensions of the WHO health promoting campus framework and with Bronfenbrenner's (1979) mesosystem analysis of the importance of connections between residential and social environments in shaping student well-being.

4.4 Evidence on Sustainable Food Provision and Student Well-being

The evidence base on sustainable food provision and student well-being in university settings has expanded considerably over the past two decades, driven by growing recognition among campus sustainability practitioners and public health researchers that the food environment of universities is a significant and modifiable determinant of student nutrition, physical health, mental health, and academic performance. The evidence reviewed in this thematic domain addresses both the direct nutritional health effects of food quality and access and the broader well-being implications of food security, food culture, and the social dimensions of campus eating.

Student food insecurity in Nigerian universities represents the most urgent and under-addressed dimension of campus food provision. Ekundayo et al. (2015) documented food insecurity rates of between 30 and 50 percent among students at Nigerian federal universities, with rates highest among students from low-income households, students in the first year of their programmes before they have established coping networks, and students in self-catering residential accommodation who lack access to any subsidised meal provision. Their analysis of the health consequences of food insecurity found that food-insecure students showed significantly higher rates of iron-deficiency anaemia, vitamin B12 deficiency, low body weight,

recurrent fatigue, and impaired cognitive performance on standardised academic tasks than food-secure peers, consistent with the global evidence on food insecurity and health outcomes documented by Gaines et al. (2014) and with Maslow's (1943) theoretical prediction that unmet physiological needs for adequate nutrition directly undermine higher-order cognitive and psychological functioning.

The relationship between the quality of campus food provision, specifically the availability and affordability of nutritious options, and student nutritional status has been examined by Nelson, Story, Larson, Neumark-Sztainer, and Lytle (2008) in a large American university study that found that students who had access to campus canteens offering a range of affordable healthy food options consumed significantly more fruit, vegetables, and lean protein and significantly less processed food, fat, and sugar than students whose campus food environment was dominated by fast food and vending machines. The dietary quality differences were associated with measurable physical health advantages including lower rates of overweight and metabolic risk markers, higher energy levels, and fewer days of self-reported illness. Gao, Shi, Zhong, Zhang, Yao, and Tian (2020) replicated these findings in a Chinese university context with some characteristics comparable to the UNN setting in terms of student residential density and campus food dependency, finding that sustainable food canteens sourcing fresh local produce produced significantly better student dietary quality and self-rated health than conventional campus canteens.

The mental health dimensions of campus food provision operate through multiple pathways that are distinct from the purely nutritional mechanism. The social function of shared eating, whether in well-designed campus dining spaces that facilitate interaction among students from different faculties and backgrounds, or in more intimate dining settings that build residential community cohesion, contributes to the

social belonging and peer connection that the well-being literature consistently identifies as the strongest protective factor against student mental health difficulties (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2007; Tinto, 1993). A campus food environment that is merely functional, providing adequate calories in settings designed for rapid throughput without social affordance, misses the community-building function of communal eating that university dining spaces can, when well designed, uniquely provide. The design of UNN's central dining facilities, if oriented toward social sustainability alongside food sustainability, could contribute to the mesosystem connections between residential, social, and academic environments that Bronfenbrenner's (1979) framework identifies as important for student well-being.

Community garden and campus farm programmes represent a dimension of sustainable food provision with particular evidence for well-being benefits that extend beyond their nutritional contribution. Soga, Gaston, and Yamaura (2017) conducted a systematic review of gardening and health and found consistent evidence that participation in horticultural activities produced reductions in depression, anxiety, and stress alongside improvements in life satisfaction and self-rated health, with effects attributable to a combination of physical activity, nature contact, social interaction, sense of achievement, and the direct nutritional benefit of fresh produce access. Van den Berg, van Winsum-Westra, de Vries, and van Dillen (2010) found that allotment gardening produced greater well-being benefits than other forms of outdoor recreation, including cycling and running, in a Dutch comparative study, attributing the difference to the multi-mechanism character of the gardening experience that simultaneously addresses physical, psychological, social, and nutritional well-being dimensions. For UNN, whose campus land area and agricultural heritage in the Nsukka farming community could support meaningful campus garden and farm initia-

tives, this evidence points to an intervention with particularly broad well-being impact potential that also connects to the university's food sustainability agenda. A community garden programme that involves students in cultivation and harvest, provides fresh vegetables to campus canteens at subsidised prices, and creates social spaces around shared horticultural activity, would simultaneously address food security, nutritional quality, mental health, physical activity, and social cohesion dimensions of student well-being within a single institutional initiative.

The evidence on sustainable food procurement policies, in which universities commit to sourcing a defined proportion of campus food from local, seasonal, and sustainably produced sources, is relevant to UNN both for its well-being implications and for its connections to the agricultural economy of Enugu State and the wider South-East region. Sonnino et al. (2016) documented the food system transformation impacts of university sustainable food procurement in several European contexts and found that procurement commitments not only improved the nutritional quality and environmental footprint of campus food but created market development effects that strengthened the supply chains of local sustainable agriculture, generating rural economic benefits that extended well beyond the campus boundary. For UNN, whose Nsukka location places it in proximity to smallholder farming communities that produce diverse food crops including yams, cassava, leafy vegetables, legumes, and fruits that currently have limited institutional market access, a sustainable food procurement commitment would simultaneously improve student nutrition, support local agricultural livelihoods, and connect the campus food system to the ecological and cultural landscape of its Igbo host community in ways that enhance the cultural resonance and community embeddedness of the university.

4.5 Governance, Policy, and the Institutional Architecture of Sustainability-Led Well-being at UNN

The realisation of the well-being benefits that UNN's campus sustainability potential makes possible depends critically on the institutional governance conditions that determine how sustainability investments are prioritised, resourced, managed, and connected to student welfare objectives. The governance landscape for sustainability and well-being at UNN reflects both the institutional heritage of a university founded with an explicit vision of ecological richness and the resource constraints and governance fragmentation that have characterised Nigerian federal universities in recent decades.

At the national policy level, the Federal Ministry of Education's policy framework for Nigerian universities does not currently include explicit requirements for campus sustainability as a student welfare dimension, and the National Universities Commission's Benchmark Minimum Academic Standards do not address the quality of campus physical environments, green infrastructure, or food provision as accreditation criteria. This regulatory gap, which is consistent with the finding documented in the previous reviews in this series for the domains of waste management and environmental education, means that sustainability investments by individual universities are discretionary and compete for resources with accreditation-linked investments in academic infrastructure, staff salaries, and library and laboratory equipment. The Okanagan Charter for Health Promoting Universities, adopted by over 100 universities internationally and endorsed by the WHO, provides a normative framework for integrating sustainability into university governance as a student health obligation rather than merely an environmental management preference, but no Nigerian federal university has formally adopted the Charter, and its principles are not reflected in the NUC accreditation framework (Okanagan Charter, 2015).

The TETFund institutional development funding stream, which provides dedicated capital grants to Nigerian federal universities for infrastructure and capacity development, has not historically prioritised campus green infrastructure or sustainable food system development as eligible investment categories, reflecting the broader exclusion of sustainability considerations from the funding criteria through which the Nigerian government shapes university development priorities (TETFund, 2021). The potential for TETFund to include campus sustainability and well-being infrastructure as eligible expenditure categories, which would immediately create a national funding mechanism for the kind of investments this review recommends, has not been systematically advocated for by Nigerian university management associations, representing a policy engagement gap that the evidence reviewed in this paper suggests should be remedied.

At the institutional level, UNN's governance of campus environment and sustainability reflects a historical division between the Works and Maintenance Department, which manages campus physical infrastructure, the Student Affairs Directorate, which manages student welfare services including counselling and health, and the academic departments of environmental science, agriculture, and related disciplines, which possess the intellectual capital relevant to campus sustainability but have not typically been engaged in institutional planning decisions. Wright (2002) documented in a comparative study of North American universities that this departmental siloing between environmental management, student welfare, and academic sustainability expertise is among the most consistent structural barriers to effective campus sustainability programming, and that universities that had created cross-departmental sustainability governance bodies with representation from facilities management, student affairs, academic departments, and student government produced significantly more

coherent and impactful sustainability programmes than those that managed each dimension through separate departmental channels. Establishing a UNN Campus Sustainability and Well-being Council with cross-institutional representation and a clear mandate to develop and monitor an integrated Campus Sustainability Strategy would provide the governance infrastructure necessary to connect the institution's inherited ecological assets to its contemporary student welfare obligations.

The UI GreenMetric World University Rankings, which annually assesses the environmental performance of over 900 universities globally across infrastructure, energy, water, waste, transportation, and education dimensions, provides an institutional incentive structure that is relevant to UNN's reputational interests as a nationally prominent and internationally connected university. The rankings include a dedicated infrastructure and green space category that rewards universities for the proportion of campus area devoted to green space, the maintenance of campus vegetation, and the provision of open green areas accessible to students, alongside food sustainability indicators that assess the availability of healthy and locally sourced food options on campus (UI GreenMetric, 2023). UNN's performance on these indicators, if formally assessed and submitted for ranking consideration, would provide both a baseline measurement of current sustainability provision and a continuous improvement target structure that can motivate and guide institutional investment in the green space and food sustainability dimensions identified in this review as most consequential for student well-being.

Student governance structures at UNN represent a significant and underutilised resource for campus sustainability and well-being improvement. The Students' Union Government, which is formally constituted with significant representational authority and established communication channels with university

management, has historically focused its advocacy on academic, financial, and political matters, and has engaged only sporadically with campus environmental quality as a student welfare concern. The evidence reviewed in the waste management and environmental education papers in this series consistently identifies student-led sustainability initiatives as producing disproportionate engagement and well-being benefits through their peer social norm functions, and the same mechanism applies to green space and food sustainability programmes at UNN. A Students' Union sustainability committee with a formal mandate to monitor campus green space quality, advocate for sustainable food provision improvements, and organise campus garden and environmental stewardship activities would simultaneously address the governance gap in campus sustainability management and generate the peer norm effects that the pro-environmental behaviour literature identifies as among the most powerful determinants of sustained engagement.

5.0. DISCUSSION

The synthesis of evidence across the five thematic domains reviewed in this paper converges on a conclusion of both theoretical coherence and practical urgency: the sustainability features of the UNN campus environment, specifically the quality and accessibility of its green spaces and the nutritional adequacy and affordability of its food provision, are significant determinants of student well-being whose improvement represents one of the most cost-effective and institutionally sustainable investments that the university can make in its student welfare obligations. The theoretical frameworks employed in the review converge on this conclusion from different analytical directions, lending it the kind of multi-source evidential robustness that single-theory analyses cannot achieve.

Attention Restoration Theory provides the most direct theoretical account of the mental health benefits of campus green space, predicting that the directed

attentional depletion produced by sustained academic effort is restored through exposure to natural environments possessing the restorative properties of being away, extent, fascination, and compatibility. The evidence from university-specific studies reviewed in Section 5.3 consistently confirms this prediction, with green space access associated with reduced perceived stress, lower cortisol, reduced rumination, and improved cognitive functioning across diverse institutional settings and student populations. The specific prediction for UNN, where the campus inherited a green infrastructure of considerable ecological extent and diversity from its founding design, is that restoring and maintaining this infrastructure to full restorative quality would produce well-being benefits distributed across the entire campus population through the incidental nature contact that students experience in moving between buildings along tree-lined paths and through parkland areas, without requiring deliberate green space visits or any specific programme participation.

Maslow's framework establishes the foundational importance of addressing nutritional and physiological needs as prerequisites for the higher-order psychological well-being that universities aspire to cultivate in their students. The food insecurity data from UNN and comparable Nigerian universities reviewed in Section 5.1 document a nutritional well-being deficit that directly undermines cognitive function, academic performance, and mental health in ways that no amount of counselling provision, green space access, or academic support programming can fully compensate for when basic physiological nutrition needs remain unmet. The policy implication is stark: investing in green spaces without simultaneously addressing the food insecurity that affects a significant proportion of UNN students is a partial response to a comprehensive well-being problem. An integrated sustainability strategy that connects campus garden and farm development to subsidised canteen provision, ensuring that

fresh produce grown on campus reaches the students who need it most at prices they can afford, addresses both the ecological and the social justice dimensions of campus sustainability as a well-being intervention.

Bronfenbrenner's Ecological Systems Theory provides the meta-level analytical framework that explains why individual-level sustainability interventions, however well-designed, will have limited and fragile impacts without the institutional governance conditions that the macrosystem analysis identifies as foundational. The fragmentation of sustainability responsibility across separate university departments, the absence of cross-institutional governance mechanisms for integrating green space, food, and well-being policy, and the lack of NUC accreditation pressure for sustainability as a student welfare standard, collectively constitute the macrosystem conditions that currently limit the well-being impact of UNN's existing sustainability assets. Addressing these macrosystem conditions through the governance reforms recommended in Section 7 is as important as the physical environment investments that are more intuitively associated with campus sustainability improvement.

The equity dimension of the evidence deserves explicit emphasis in the discussion because it is both theoretically predicted by the frameworks employed and practically important for an institution with a social justice mandate. The evidence consistently shows that the well-being benefits of campus green spaces and sustainable food provision are largest for the most economically disadvantaged students, those for whom the campus environment provides the primary access to green environments and nutritious food that their off-campus circumstances do not supply. At UNN, where a significant proportion of the student population comes from economically marginalised households in Enugu State and the wider South-East region, the equity argument for investing in campus sustainability as a well-being strategy is as compelling as the aggregate well-being argument. Sustain-

ability improvements that are designed with equitable spatial distribution, affordable pricing, and targeted outreach to the most vulnerable student subpopulations will produce the greatest well-being returns per unit of institutional investment, while simultaneously fulfilling UNN's founding commitment to educational access and social development.

6.0. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

This systematic review concludes that campus sustainability initiatives constitute a significant but underutilised pathway for enhancing student well-being at the University of Nigeria, Nsukka. The evidence indicates that UNN possesses a relatively strong ecological foundation in its inherited green infrastructure and campus spatial design; however, this potential is not fully realised due to inadequate maintenance, fragmented sustainability governance, and limited integration of environmental planning with student welfare objectives. Across the reviewed literature, improvements in campus green spaces, sustainable food provision, and walkable built environments consistently demonstrate positive associations with student physical health, mental health, psychological resilience, and sense of belonging. These outcomes suggest that student well-being is closely linked to the ecological and infrastructural quality of the campus environment. The study therefore establishes that campus sustainability should not be treated as a peripheral environmental concern but as a central institutional strategy for student health promotion and holistic educational development at UNN.

6.2 Recommendation

- **Develop an Integrated Campus Sustainability and Well-being Policy:** UNN should formulate a comprehensive institutional strategy that formally links campus sustainability (green spaces, food systems, walkability, and infrastructure design)

to measurable student well-being outcomes. This policy should include clear performance indicators and be embedded within institutional planning and budgeting frameworks.

- **Establish a Campus Green Infrastructure Restoration and Expansion Programme:** The university should prioritise the rehabilitation of degraded green spaces, pedestrian pathways, and recreational natural areas while expanding green coverage in underserved residential and academic zones to maximise accessibility and restorative benefits for students.
- **Implement a Sustainable Campus Food Systems Programme:** UNN should introduce structured campus food reforms that promote affordable, nutritious, and locally sourced meals, alongside the development of student-engaged community gardens to improve food security, dietary quality, and experiential learning opportunities.
- **Integrate Sustainability into Campus Health and Student Support Services:** Student health services should incorporate environmental and nutritional well-being assessments into routine support systems, recognising the link between physical environment, diet, and psychological health outcomes.
- **Adopt Walkability and Active Mobility Infrastructure Improvements:** The university should improve pedestrian safety, lighting, pathways, and connectivity across campus to encourage physical activity, reduce stress associated with movement, and enhance overall campus accessibility.
- **Strengthen Institutional Governance for Sustainability Implementation:** A dedicated Campus Sustainability and Well-being Unit should be established to coordinate initiatives across departments, ensuring accountability, continuity, and alignment between environmental planning and

student welfare objectives.

- **Engage in National and International Benchmarking Systems:** UNN should actively participate in frameworks such as the UI GreenMetric World University Rankings to benchmark progress, attract institutional funding opportunities, and strengthen external accountability for sustainability and student well-being performance.

7.0. LIMITATIONS

This systematic review has several limitations that should be considered when interpreting its findings. The most significant limitation is the absence of primary empirical data from the University of Nigeria, Nsukka (UNN), specifically examining the relationship between campus sustainability features and student well-being outcomes. As a result, the conclusions are largely based on the theoretical transfer of evidence from other African universities, particularly South African institutions, as well as Global North contexts. These settings differ from UNN in terms of institutional governance structures, ecological conditions, student socioeconomic profiles, and cultural practices, which may influence the applicability of the findings.

Additionally, while the review followed PRISMA 2020 guidelines, it was not pre-registered in a protocol registry such as PROSPERO, limiting external transparency and protocol verification. Furthermore, the limited availability of high-quality, peer-reviewed Nigerian studies on campus sustainability and student well-being necessitated reliance on indirectly comparable evidence, which may affect the precision of inferred relationships.

Finally, the magnitude and causal direction of the identified relationships remain untested in the UNN context. Future longitudinal, primary empirical studies using validated well-being and environmental assessment tools are required to strengthen contextual validity and confirm the proposed associations.

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