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Linking Urban Landscape Design, Health, and Sustainability: Insights from Nature-Based and Environmental Psychology Approaches

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Abstract

This study highlights the crucial role of urban landscape design as a multidisciplinary and strategic approach for promoting healthy and sustainable behaviors in urban areas. This research, grounded in environmental psychology, integrates theories such as Attention Restoration Theory (ART), the Biophilia Hypothesis, and the Theory of Planned Behavior to examine how natural and socio-spatial design elements influence mental well-being, physical activity, and behavioral patterns. The findings suggest that urban landscapes designed thoughtfully can significantly enhance psychological restoration, social interaction, and a sense of environmental responsibility. Moreover, incorporating Crime Prevention Through Environmental Design (CPTED) principles contributes to increased public safety. Emphasizing participatory planning, historical preservation, and socially inclusive design practices, the study proposes an integrated framework for creating resilient, equitable, and health-promoting urban environments. This framework responds to the growing global demand for adaptive, research-driven urban strategies rooted in both ecological and psychological sustainability.

Keywords*:* Healthy Behavior, CPTED, Environmental Psychology, Nature-Based Solutions, Social Inclusion.

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1. Introduction

1.1 Background and Context

Urban landscape design has emerged as a pivotal factor that influences human behavior, promoting public health, and guiding the trajectory of sustainable urban development. With accelerating urbanization and increasing population density, the built environment plays an increasingly important role in shaping not only physical health but also psychological and social well-being. Urban living has been acknowledged as detrimental to health (Flies et al., 2019), making the promotion of health in such environments a key focus of international and regional conventions (United Nations, 2021). Modern urban design is now expected to move beyond functional and aesthetic considerations, aiming instead to foster inclusive, resilient, and health-promoting environments. Environmental quality is a significant determinant of public health outcomes. Urban areas are increasingly recognized as facing

complex and interrelated environmental challenges (Nita et al., 2022). Consequently, landscape architects and urban planners are confronted with the multifaceted task of designing spaces that support mental well-being, promote ecological responsibility, and enhance social cohesion.

An expanding body of evidence supports the restorative and prosocial benefits of well-designed green spaces. Research shows that exposure to natural environments enhances cognitive performance, reduces stress, and regulates emotions (Abraham et al., 2010). The concept of Nature-Based Solutions (NBS) has recently been defined by the Resolution on Nature-Based Solutions for Supporting Sustainable Development as "actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal, and marine ecosystems, which address social, economic, and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience, biodiversity, and other co-benefits" (UNEA-5, 2022). Not every green or blue intervention qualifies as an NBS—only those that follow a systematic process aligned with the IUCN (2020) principles and meet the NBS criteria outlined by UNEA-5 (2022) can be considered legitimate Nature-Based Solutions. Furthermore, psychological outcomes in dense urban contexts are strongly influenced by factors such as access to restorative settings, perceptions of safety, housing quality, and opportunities for social participation (Chu et al., 2004). These findings collectively emphasize the critical importance of landscape design as a key determinant of healthy, inclusive, and socially integrated urban experiences.

1.2 Research Gap and Niche

Despite progress in urban design theory and practice, critical gaps remain—especially in integrating mental well-being and environmental safety into public space design. Mental security refers to the psychological comfort and perceived safety that individuals experience within public spaces, and it is a key determinant of reduced anxiety, enhanced sociability, and increased urban livability. Nature-Based Solutions (NBS), including green corridors, biophilic structures, and ecological connectivity, are recognized for their role in alleviating cognitive fatigue and restoring psychological balance. Concurrently, principles of Crime Prevention Through Environmental Design (CPTED)—such as territoriality, visibility, and natural surveillance—can enhance perceptions of safety and reduce crime (Armitage, 2017; Armitage & Joyce, 2019). However, recent studies indicate that some technologically-enhanced NBS may inadvertently degrade everyday experiences of urban nature when they introduce noticeable landscape changes (Li & Nassauer, 2021a; Li et al., 2022b).

However, in many urban neighborhoods, particularly in historic districts in countries such as Iran, issues such as urban degradation, weakened social cohesion, and reduced perceptions of safety remain widespread (Rahnama & Hosseinian, 2015). Such deteriorating conditions undermine the inclusiveness and appeal of public spaces, discourage nighttime activities, and weaken community ties (Carmona et al., 2010). As Lynch (1981) argued, a vibrant and democratic urban life depends on users' sense of security and freedom in using public spaces.

Although the literature offers influential theoretical models—such as Kaplan's Attention Restoration Theory (ART), Ulrich's Stress Reduction Theory (SRT), and Gehl's concept of "Life Between Buildings"—an integrated framework that simultaneously addresses mental well-being, environmental safety, and ecological sustainability remains lacking. Additionally, insights from behavioral urban economics suggest that thoughtful design elements can subtly nudge individuals toward adopting pro-environmental behaviors (Shanahan et al., 2019), yet such principles remain underutilized in practical design applications.

1.3 Research Aim and Contribution

To address this theoretical and practical gap, the present study proposes a multidisciplinary conceptual framework that integrates insights from environmental psychology, behavioral science, and urban landscape design. The objective is to explore how urban spatial configurations can serve as proactive tools for enhancing public health and fostering sustainable behaviors.

This study is guided by two central research questions:

1. How can urban landscape design be harnessed to support both physical and mental well-being?
2. What spatial strategies can encourage environmentally responsible and health-promoting behavioral patterns among urban residents?

Employing a descriptive-analytical methodology, the research synthesizes relevant theoretical models, examines international and local case studies, and identifies actionable design strategies. Through this integrative approach, the study contributes to the evolving discourse on adaptive, inclusive, and salutogenic urban environments—spaces that actively promote ecological resilience and behavioral well-being.

2. Materials and Methods

This research employs a descriptive-analytical methodology to integrate diverse theoretical perspectives from environmental psychology, landscape architecture, and urban design with empirical analyses of real-world urban spaces. The primary objective is to investigate how targeted urban landscape interventions can enhance mental well-being, promote sustainable behavioral patterns, and improve both environmental and social security within urban contexts.

To ground the conceptual framework in practical application, the study uses secondary data from Superkilen Urban Park in Copenhagen, Denmark. Superkilen is selected as a paradigmatic case study because it embodies key theoretical principles discussed in this research. The park's design integrates multicultural symbolism, green infrastructure elements, and pedestrian-oriented circulation networks, which collectively foster physical activity, social cohesion, and intercultural interaction. Furthermore, Superkilen incorporates Crime Prevention Through Environmental Design (CPTED) strategies—such as open sightlines, multifunctional public spaces, and inclusive design features—aimed at reinforcing mental security and enhancing perceived safety (Armitage, 2017; Armitage & Joyce, 2019).

The research methodology further synthesizes contemporary empirical findings to deepen the analysis. Access to optimized natural lighting—including parameters such as intensity and color temperature—has been shown to enhance mood and alertness (Berman et al., 2019). Moreover, walkability in urban environments is widely recognized as a critical factor positively correlated with increased physical activity and stronger neighborhood social ties (Cohen et al., 2007).

In summary, the adopted multidisciplinary methodology synergistically integrates spatial design strategies, advanced technological tools, and socio-cultural considerations to develop an integrated planning framework aimed at fostering salutogenic urban landscapes. By embedding CPTED principles alongside sustainability metrics (Cozens & Hillier, 2019), this approach ensures that urban design interventions contribute to personal security, social vitality, and ecological resilience — essential pillars for promoting healthy and sustainable cities.

3. Results

This section presents a comprehensive, multidimensional analysis of how urban landscape design contributes to salutogenic outcomes—those actively promoting well-being—across psychological, physical, social, and ecological dimensions. By synthesizing evidence from theoretical frameworks and case-based observations, the findings substantiate the critical role of spatial configurations in shaping human experiences, health behaviors, and perceptions of safety.

3.1. Psychological Well-being and Cognitive Restoration

Exposure to natural elements within urban contexts significantly reduces stress, enhances attentional capacities, and alleviates symptoms of anxiety and depression. These effects align with Kaplan's Attention Restoration Theory (1995), which emphasizes the restorative capacity of natural environments in alleviating mental fatigue. Empirical evidence confirms that green infrastructure—including vegetation, water features, and soft textures—enhances visual comfort and fosters emotional balance, corroborating findings by Street et al. (2007) and Mason and Holt (2012). These findings

underscore the necessity of integrating restorative landscape elements into urban design to address the escalating mental health challenges in densely populated cities.

3.2. Biophilic Design and Emotional Regulation

Building upon the Biophilia Hypothesis (Wilson, 1984), the results indicate that environments incorporating natural light, organic forms, and natural materials positively influence neurochemical responses. These design elements have been shown to regulate circadian rhythms and elevate serotonin levels, thereby contributing to improved mood, emotional regulation, and psychological resilience. These biophilic strategies demonstrate quantifiable physiological and psychological benefits, underscoring their significance in salutogenic urban planning.

3.3. Physical Activity and Health Promotion

Public parks and urban greenways that facilitate active engagement have been shown to significantly enhance both physical and mental well-being. Consistent with Kemel et al. (2022), low-impact activities such as walking and stretching in well-designed open spaces contribute to cardiovascular health and emotional stability—especially among youth and other vulnerable groups. Moreover, these spaces act as informal social hubs, fostering both individual resilience and community vitality.

3.4. Walkability and Community Interaction

Findings indicate a strong positive correlation between walkable environments and increased social interaction. Neighborhoods prioritizing pedestrian and cycling infrastructure demonstrate improved public health outcomes, including lower obesity rates and enhanced cardiovascular fitness. Such urban conditions facilitate spontaneous social encounters, fostering trust and social capital—findings consistent with Cohen et al. (2007). Consequently, walkability emerges as a fundamental design principle for fostering both social cohesion and public health.

3.5. Promotion of Sustainable Behaviors

The study identifies urban green infrastructure—including green roofs, permeable pavements, recycling hubs, and interactive water features—as behavioral catalysts that reinforce pro-environmental attitudes. Residents in these environments exhibit higher recycling rates and more energy-conscious behaviors, consistent with Ajzen's Theory of Planned Behavior (1991). These findings suggest that design can serve as a strategic tool to 'nudge' citizens toward more sustainable behaviors, effectively integrating behavioral economics into spatial planning.

3.6. Safety and Crime Prevention

The application of Crime Prevention Through Environmental Design (CPTED) strategies—including open sightlines, adequate lighting, spatial legibility, and multifunctional public spaces—has demonstrably enhanced perceptions of safety and reduced crime occurrences. This supports Jeffery's (1971) criminological framework and aligns with recent findings by Absalan et al. (2023). Integrating these principles is particularly effective when seamlessly embedded into the aesthetic and functional dimensions of public space design.

3.7. Revitalization of Historical Spaces

This research underscores the transformative impact of landscape-led revitalization on deteriorated urban fabrics. Particularly in heritage-rich yet deteriorating environments—such as historic Iranian neighborhoods—design interventions have reactivated underutilized spaces, fostered place attachment, and revitalized collective identity (Rahnama & Hosseinian, 2015). These efforts have not only enhanced aesthetic and functional value but have also stimulated social and economic regeneration, thereby contributing to urban resilience.

3.8. Social Cohesion and Public Interaction

Multifunctional public spaces have emerged as crucial facilitators of social life and civic identity. These designed spaces, supporting diverse activities—from spontaneous gatherings to planned events—encourage intergroup interaction and democratic spatial participation. These observations resonate with Gehl's (2010) theory of 'life between buildings.

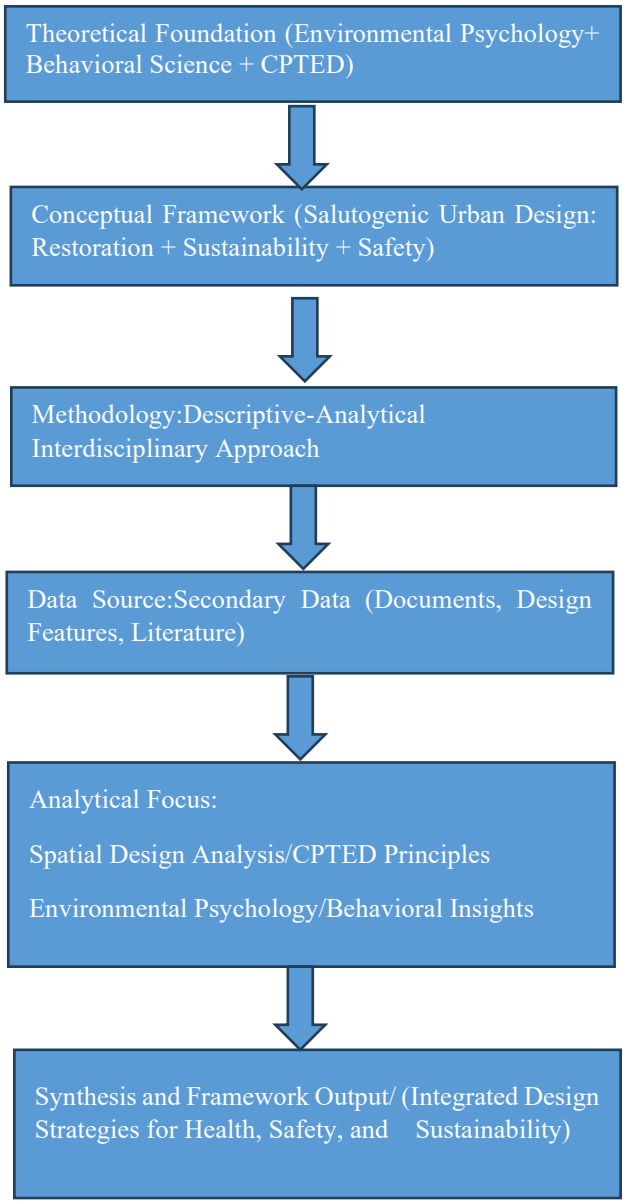

Figure 1. Conceptual Framework for Healthy and Sustainable Urban Landscape Design

4. Discussion

The findings of this study provide robust support for the proposition that urban landscape design can serve as a proactive agent in fostering salutogenic environments—spaces that not only mitigate harm but actively promote health, well-being, and social vitality. By synthesizing theoretical constructs from environmental psychology, behavioral sciences, and urban design, this research offers a distinctive contribution to the evolving discourse on salutogenic urbanism.

4.1. Restorative Design: Nature as an Urban Necessity

The validated applicability of Kaplan's Attention Restoration Theory (1995) and Wilson's Biophilia Hypothesis (1984) underscores the imperative to integrate natural elements into everyday urban experiences—not merely as ornamental features but as essential infrastructure for psychological

resilience. The presence of green corridors, sensorially rich natural materials, and controlled access to daylight fosters not only attention restoration but also emotional self-regulation. In contexts of intensifying urban stressors, restorative landscape design emerges as a vital strategy for enhancing urban mental health.

4.2. Movement as Medicine: Design-Enabled Physical Activity

The results demonstrate that urban design is not neutral; rather, it actively shapes health behaviors. Parks, pathways, and inclusive exercise zones act as behavioral prompts encouraging movement and reducing sedentary lifestyles. These findings affirm that physical infrastructure plays a dual role: improving physical health outcomes while simultaneously facilitating cognitive clarity and emotional balance through embodied interaction with space (Kemel et al., 2022). Therefore, urban planners must view activity-supportive design as both a health intervention and an instrument of equity.

4.3. Nudging Sustainability: Behavior-Responsive Infrastructure

This study reinforces the behavioral dimension of sustainable design by demonstrating how spatial cues and infrastructural affordances influence pro-environmental behaviors. Drawing on Ajzen's (1991) Theory of Planned Behavior, the findings suggest that environments normalizing sustainable actions—through visibility, accessibility, and social reinforcement—generate long-term shifts in collective behavior. Design thus becomes a silent pedagogue, imparting ecological responsibility through experience rather than prescription.

4.4. Safe by Design: Reframing Urban Security

The integration of CPTED principles affirms that urban safety is inherently spatial. Rather than relying solely on surveillance or enforcement, this research confirms that environmental legibility, open sightlines, and territorial reinforcement foster both perceived and actual safety (Jeffery, 1971; Absalan et al., 2023). Importantly, safety-enhancing design also fosters social presence, transforming neglected or threatening areas into inclusive, vigilant, and activated urban commons.

4.5. Heritage-Led Urban Regeneration

Urban memory and spatial identity are frequently overlooked in discourses surrounding health and sustainability. Nevertheless, this study reveals that revitalizing heritage sites through participatory, place-sensitive design significantly contributes to socio-cultural resilience and civic trust—especially within contexts of spatial decay or social fragmentation (Rahnama & Hosseinian, 2015). These interventions exemplify how heritage can function not as a barrier to innovation, but rather as a foundation for inclusive and forward-looking urban transformation.

4.6. Public Space as Democratic Infrastructure

Social sustainability hinges on the vitality of public life, and this study confirms that well-designed multifunctional spaces play a pivotal role in fostering inclusion, dialogue, and civic expression. The validation of Gehl's (2010) principles across case studies demonstrates that social interaction is not spontaneous but spatially mediated. When designed with accessibility and flexibility in mind, public spaces evolve into platforms for urban democracy—enabling diverse users to coexist, express themselves, and collaborate in shaping shared futures.

Table 1. Urban Landscape Design Outcomes and Theoretical Integration

Aspect	Key Findings	Theoretical Framework	Illustrative Examples
Psychological Health	Nature exposure reduces anxiety and stress, enhances cognition	Attention Restoration Theory (Kaplan, 1995)	Urban gardens, nature-view corridors

Cognitive Recovery	Natural settings accelerate recovery from mental fatigue	Attention Restoration Theory	Restorative green infrastructure in high-stress zones
Emotional Regulation	Light, greenery, and organic materials improve serotonin and mood	Biophilia Hypothesis (Wilson, 1984)	Biophilic design, daylight strategies
Physical Activity	Parks and trails stimulate movement and resilience	Environmental Psychology & Public Health	Active urban parks, youth fitness zones
Walkability	Walkable areas enhance cardiovascular health and social interaction	Walkability Theory; Cohen et al. (2007)	Mixed-use neighborhoods with pedestrian access
Sustainability	Green infrastructure encourages eco-friendly behavior	Theory of Planned Behavior (Ajzen, 1991)	Vertical gardens, water reuse systems, visible recycling
Urban Safety	CPTED principles reduce crime and boost perceived safety	CPTED (Jeffery, 1971)	Well-lit public plazas, territorial design cues
Heritage Identity	Revitalized heritage sites enhance community trust and economic activity	Place Attachment; Rahnama & Hosseinian (2015)	Adaptive reuse of decayed historic urban fabric
Social Cohesion	Inclusive public spaces support interaction, inclusion, and civic life	Gehl (2010	Civic squares, multifunctional event-friendly spaces

5. Conclusion

This study demonstrates that urban landscape design transcends aesthetics and functionality, serving as a strategic framework for enhancing the holistic well-being of urban populations. The findings reveal that well-designed urban spaces significantly contribute to improving mental health, promoting physical activity, mitigating urban crime, and fostering sustainable behavioral patterns. These outcomes are underpinned by environmental psychology theories, including Attention Restoration Theory (ART), the Biophilia Hypothesis, and the Theory of Planned Behavior, which collectively affirm the influence of nature-based and socially responsive design elements on individual and community behaviors.

The research further validates the applicability of Crime Prevention Through Environmental Design (CPTED) principles in shaping urban environments that are simultaneously safe and socially engaging. The adaptive reuse of historic sites, coupled with an emphasis on inclusive and participatory design approaches, highlights the role of landscape planning in strengthening community resilience and reinforcing a shared urban identity.

In response to the multifaceted challenges posed by mental fatigue, social alienation, environmental stressors, and urban insecurity, this study underscores the necessity of adopting an integrated, evidence-based urban landscape planning paradigm. Such an approach should prioritize psychological comfort, public health, ecological responsibility, and social inclusivity across multiple spatial scales. Future urban development strategies must recognize the transformative potential of landscape design to promote adaptive, resilient, and salutogenic urban environments.

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The author(s) declare(s) no conflicts of interest.

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The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

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