



Planning the Urban Commuting-Workplace Green Space Continuum from a Health Promotion Perspective: An Integrative Theoretical Framework and Multi-Case Comparative Study

Zhengying Chen

Wuhan Technology and Business University, Wuhan, Hubei, 430000, PRC, China
956607924@qq.com

Abstract. Against the backdrop of rapid global urbanization and the knowledge economy, the health of working populations faces systemic challenges. While urban green space is widely recognized as a key health-promoting environment, existing research and practice exhibit a significant spatial fragmentation, failing to address the commuting corridor and workplace green space as an integrated continuum affecting daily health. This study proposes the concept of a commuting-workplace green space continuum and develops a four-tier integrative analytical framework: "Planning Intervention – Spatial Experience – Mechanism of Action – Health Outcome." Through a theory-building comparative case study of eight globally diverse cases, this research identifies a golden triangle of synergistic mechanisms—seamless physical connectivity, consistent policy signals, and perceived benefits—essential for an effective continuum. The findings reveal a critical paradigm shift from treating green space as a static destination to designing it as a high-quality daily pathway. Furthermore, a typology of planning interventions is constructed, distinguishing between efficiency-oriented and experience-oriented corridors. The study concludes with theoretical implications for built environment-behavior theories and restorative environments, alongside practical strategies for integrated planning. It argues that weaving green infrastructure into the daily functional flows of the city through synergistic spatial, policy, and perceptual design is key to fostering urban environments that truly support occupational health.

Keywords: Urban Commuting Corridor, Workplace Green Space Planning, Health Promotion, High-Stress Occupations.

1 Introduction

Global urbanization is reshaping the landscape of human life at an unprecedented pace. A growing majority of the world's population continues to concentrate in cities, with metropolitan regions increasingly becoming the primary arenas of everyday life for hundreds of millions of people. Accompanying this trend is the decline of rural populations and the relative marginalization of smaller towns. Amid this structural

transformation, urban residents have succeeded in keeping many of nature's physical threats at bay, yet they are also becoming progressively detached from the restorative nourishment of the natural environment. Instead, they are exposed to the risks of "involutionary" psychological stress generated by the high-intensity, high-density conditions of urban living. Against this backdrop, natural landscapes within cities, as accessible and low-cost therapeutic resources, are assuming ever greater significance.

Under the wave of modern office models driven by the knowledge economy, the health of the working population is facing systemic challenges. The World Health Organization (WHO) has indicated that sedentary behavior, chronic stress, the widespread prevalence of sub-optimal health conditions, and diseases associated with urban environmental pollution have become serious public health concerns [1]. Cities, as humanity's primary habitats and workplaces, have seen the impact of their built environments on residents' health emerge as a frontier issue at the intersection of public health, urban planning, and environmental psychology. The global rise of the principles of Healthy Cities marks a fundamental shift from a disease-treatment-centered approach toward one focused on health promotion [2]. Within this trend, urban green spaces, as key health-supportive environments, have been extensively demonstrated to exert positive and far-reaching effects on public health through multiple pathways, including promoting physical activity, alleviating psychological stress, improving local environmental quality, and fostering positive social interactions [3].

The working population, as the backbone of urban economic and social functioning, follows highly routinized daily life trajectories that are primarily anchored between places of residence and places of work. The commuting corridors that connect these two nodes, together with office districts as the terminal destinations of daily activities, constitute two critical spatial units shaping gains and losses in daytime health.

However, existing research and practice are marked by a profound form of spatial fragmentation. On the one hand, the planning and study of commuting corridors have long focused on traffic efficiency and safety, leaving largely unrecognized and underexplored their substantial potential for health promotion as high-frequency, routine settings of everyday exposure to nature. On the other hand, attention to green spaces in office districts has been largely confined to the optimization of static environmental quality within buildings or enclosed campuses, neglecting their dynamic connections and functional synergies with the broader urban green network—particularly their integration with commuting routes.

From the perspective of individuals' continuous daily spatial experiences and health trajectories, environmental stress exposures during commuting (such as crowding, noise, air pollution, and prolonged, monotonous waiting) and the environmental qualities encountered upon arrival at the workplace (such as views of natural landscapes, green rest spaces, and overall spatial comfort) jointly and sequentially shape the accumulation of stress and the balance of recovery over the course of a day. Therefore, treating commuting corridors and office-area green spaces as an interconnected and mutually influential health space continuum, and planning and designing them in an integrated and systematic manner, is of critical practical and

theoretical significance for addressing the widespread health challenges faced by contemporary working populations.

Although a substantial body of literature has examined urban green spaces and public health, the built environment and psychological stress, and the application of biophilic design in workplaces, a critical interdisciplinary research gap remains: how can green spaces along commuting corridors, which connect places of residence and work, and green spaces in office districts, which serve as the terminal destinations of daily activities, be planned in a coordinated manner and designed in an integrated way from a holistic and continuous health-promotion perspective?

This study aims to systematically address the following core questions by constructing an integrative theoretical analytical framework and conducting comparative research based on a diverse set of representative cases from around the world: Through which principal pathways do green spaces along urban commuting corridors and green spaces in office districts respectively influence the psychophysiological health of working populations, particularly those in high-stress occupations and what kinds of interactions and cumulative effects exist between the two? What key spatial characteristics, design strategies, and management models define commuting corridors and office-district green spaces that effectively promote health? From the perspective of urban planning and design, how can these two types of green spaces be synergistically integrated to construct a seamless, health-supportive environmental system that spans the entire commuting–working process?

The central hypothesis of this research is that, compared with planning commuting corridors or office-district green spaces in isolation and fragmentation, treating them as an organic commuting–office health continuum and planning and designing them in a coordinated manner can generate more significant and more sustainable health-promotion benefits. This synergistic effect arises from the temporal accumulation and continuity of the health effects of exposure to nature. Specifically, high-quality green spaces along commuting corridors—whether experienced through passive viewing or active movement—can effectively reduce baseline stress levels and cognitive fatigue upon arrival at the workplace, thereby creating a more favorable starting point for the subsequent positive psychophysiological benefits of green space exposure within office environments. This synergy is manifested in the continuity of physiological recovery, the stepwise alleviation of psychological stress, and the seamless activation and reinforcement of health-promoting behaviors, such as active commuting and outdoor activities during work breaks.

To this end, this paper adopts a methodology that combines theoretical framework construction with comparative case studies. First, through a comprehensive literature review, theories related to health promotion, environmental psychology, and urban planning are synthesized to propose a logical model of “planning interventions–mechanisms of action–health outcomes” as the analytical framework. Subsequently, eight global case studies are carefully selected for in-depth comparative analysis, chosen to maximize diversity in cultural context, urban form, dominant development models, and occupational settings.

This research seeks to achieve the following objectives: theoretically, to construct an integrated healthy urban design framework that bridges mobile and static settings, thereby advancing in-depth dialogue among public health, environmental psychology, and spatial planning; methodologically, to systematically review the design and evaluation approaches of relevant empirical studies, providing methodological references for future research; and practically, to offer urban planners, landscape architects, public health policymakers, and corporate managers an evidence-based and operational set of coordinated planning strategies and design guidelines, aimed at collectively creating urban environments that genuinely support the health of working populations.

2 Literature Review

2.1 Health Promotion and Urban Green Spaces

Within the macro framework of health promotion, examining the impacts of the urban built environment on public health has become a frontier of multidisciplinary inquiry. The World Health Organization (WHO) defines “health promotion” as “the process of enabling people to increase control over, and to improve, their health,” marking a paradigm shift from disease treatment toward the active construction of health [2]. Under this paradigm, urban green spaces are widely recognized as key health-supportive environments, and their value has gained broad acknowledgment. A large number of systematic reviews and meta-analyses have confirmed that exposure to green spaces can influence physical, psychological, and social health through multiple pathways [3], including promoting physical activity, alleviating psychological stress, improving environmental quality, and facilitating social interaction [4].

Classic theories in environmental psychology provide core explanations for the mechanisms through which green spaces promote health. Ulrich’s Stress Recovery Theory (SRT), from an evolutionary adaptation perspective, suggests that natural landscapes can rapidly elicit positive emotional responses and physiological relaxation, thereby alleviating psychological stress [5]. Kaplan’s Attention Restoration Theory (ART) further elucidates that the “soft fascination” characteristic of natural environments can attract involuntary attention, enabling the restoration of directed attention that has become fatigued by urban settings, thus improving cognitive function and emotional regulation [6]. Together, these theories establish natural environments as effective “psychological resource restoration settings” for urban populations. Empirical studies have also widely supported the positive associations between residential greenness, park accessibility, and reductions in symptoms of depression and anxiety [7], as well as improvements in subjective well-being, firmly establishing the foundational pathway of “nature exposure → individual mental health” [8].

2.2 Review of Research on the Health Impacts of Commuting and Office Environments

Commuting is far from a temporally and spatially neutral expenditure; it constitutes a multidimensional arena of stress exposure in its own right. The physical, social, and psychological characteristics of commuting environments can directly trigger acute stress responses and, through cumulative and spillover effects, profoundly influence workplace performance. For public transit users, key stressors include vehicle crowding, unpredictable delays, noise, and potential social conflicts [9]. For private car commuters, stress mainly arises from feelings of loss of control due to congestion, travel time variability, and sustained cognitive load from driving [10]. Such commuting stress has been shown to negatively “spill over” into the workplace, affecting emotions, behaviors, and cognitive functioning [11].

Active commuting modes such as walking and cycling are often regarded as healthy choices because they combine physical activity with potential contact with nature. However, their benefits are highly “conditional.” Active commuting undertaken in safe, pleasant, and well-connected green corridors can indeed reduce physiological stress indicators and enhance positive emotions [12]. By contrast, in environments characterized by severe pollution and a lack of safe continuity, active commuting may become a dual physiological and psychological burden [13]. This suggests that the overall quality of the commuting environment, rather than commuting mode alone, is the key determinant of health outcomes.

Research on office-environment health has increasingly focused on the restorative effects of green spaces, spanning scales from micro-level interventions within buildings to macro-level external accessibility. At the micro scale, the introduction of plants or views of natural landscapes at workstations has been shown to generate rapid restorative effects. Brief visual exposure (3–5 minutes) to natural elements, compared with built environments, more effectively reduces task-induced increases in heart rate and blood pressure and improves performance on attention tests [14], in line with the explanations of Attention Restoration Theory.

At the macro scale, access to high-quality natural views from office windows is positively associated with employees’ long-term mental health indicators, such as slower growth in perceived stress and fewer sick-leave days [15]. The proximity of workplaces to parks and other green spaces not only provides opportunities for restorative activities during work breaks but also encourages physical activity. Studies show that employees who use nearby parks during lunch breaks report higher levels of afternoon work focus [16]. However, accessibility does not equate to actual use: the quality, safety, and maintenance of green spaces are critical mediating factors influencing real-world utilization. Moreover, the benefits of green spaces are moderated by organizational context, with restorative effects being more pronounced in jobs characterized by high workloads and low autonomy [17].

2.3 Key Research Gaps and the Positioning of This Study

In summary, the existing literature reveals three interrelated key gaps that constrain its ability to inform planning practice.

The first is a gap in subject differentiation. Most studies treat high-stress populations as a homogeneous group, lacking systematic comparisons across different occupational types—such as those characterized by high cognitive load, high emotional labor, or high decision-making pressure—in terms of stressors, work patterns, and spatial needs.

The second is a gap in spatial integration. Current research exhibits pronounced static and fragmented tendencies. On the one hand, insufficient attention is paid to green spaces along commuting corridors, despite their role as high-frequency exposure settings. On the other hand, studies of office-district green spaces are often disconnected from the commuting process. Few studies conceptualize these spaces as a continuous spatial sequence shaping daytime stress accumulation and recovery, and empirical evidence on their interactions and chain effects remains scarce.

The final gap lies in empirical depth. The majority of studies rely on remote sensing data or subjective questionnaires, with a paucity of fine-grained empirical research that links specific planning indicators to micro-level, objective individual health metrics. As a result, the causal chain between planning and design interventions and health outcomes remains insufficiently robust.

Accordingly, this study seeks to integrate the dimensions of occupational heterogeneity and commuting–office spatial continuity. By constructing an integrative theoretical framework and conducting multi-case comparative analyses, it systematically explores how commuting corridors and office-district green spaces can be planned in a coordinated manner to build a health-supportive environmental system that spans the entire commuting–working process.

3 Analytical Framework and Methodology

3.1 Research Design

This study adopts a secondary-data–based comparative case study approach. It selects cases that differ markedly in urban environments, occupational contexts, and cultural backgrounds, yet all have successfully implemented green and health-oriented commuting practices. Through comparison, the study seeks to distill universally applicable success factors as well as context-specific constraints.

3.2 Cases Selection

Case selection follows the principle of theoretical sampling, ensuring maximum coverage of key dimensions of variation in the research phenomenon. The selection process proceeded as follows. First, representative successful cases were identified from different metropolitan areas that confront extremely high-pressure work environments, encompass diverse occupational types, feature typical “metro +

walking” commuting patterns, offer diversified green space configurations, and exhibit pronounced job–housing separation; the majority of the selected studies are drawn from high-income countries. Second, cases representing different urban planning philosophies and cultural contexts that have nonetheless achieved health-promotion objectives were chosen, and major office-related corridor spaces—such as commuting corridors and core green spaces—were mapped for different commuting modes. Finally, with attention to major employers and workforce composition, peak commuting characteristics, and the distribution of green space systems, the study examines the application of similar health-oriented green space concepts in both public spaces and non-public urban domains.

The following Table 1 presents a summary of the eight most differentiated typical cases selected from cities meeting the aforementioned criteria.

Table 1. Basic Case Information and Selection Criteria.

Core Planning Project / Area	Dominant Mode	Rationale for Selection
Singapore ABC Waters Program and the CBD (Marina Bay)	State-led systematic ecological infrastructure	Demonstrates spatial continuity, with waterfront corridors seamlessly integrated into the CBD.
Copenhagen Bicycle Superhighways and adjacent districts	Municipality-led, policy-driven	Illustrates the health-oriented transformation of efficiency-focused commuting corridors
New York High Line and surrounding districts	Post-industrial regeneration–driven linear park	Demonstrates how experience-oriented corridors reshape the value of office districts
Tokyo Imperial Palace Outer Gardens and the Hibiya Park catchment area	Central green space radiating model	Represents a high-density Asian metropolis
Tokyo Roppongi Hills mixed-use complex	Vertical integration of buildings and green space	Exemplifies three-dimensional green space
Silicon Valley Apple Park	Corporate enclave	Explores the extreme construction of a green space continuum within the private domain
Shenzhen Upper Hills (Shenye Shangcheng) “Loft” corridor system	Aerial connectivity in a high-density city	Demonstrates three-dimensional connectivity practices in

Shanghai Xuhui Riverside open space and West Bund Media Port	Waterfront industrial-heritage regeneration belt	China's high-density context Demonstrates the linkage between large-scale linear parks and office districts in the Chinese context
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3.3 Analytical Framework and Process

We developed a four-tier integrative framework of planning interventions – spatial experience – mechanisms of action – health outcomes to systematically examine the health-promotion logic of the continuum.

For each selected case, we systematically collected multi-source secondary data, primarily including academic literature, such as empirical studies and theoretical discussions related to the case; policy and planning documents, including master plans, thematic design reports, and evaluation documents issued by governments; publicly available case descriptions, drawn from authoritative institutions or renowned design firms; and visual and cartographic materials, such as satellite imagery, design renderings, and on-site photographs. All materials were organized into case-specific archives and preliminarily synthesized to establish a factual baseline for each case.

The analysis followed an iterative process, cycling between within-case analysis and cross-case comparison. Each case was first examined in depth using a process-tracing logic to identify causal-chain evidence linking planning interventions-mechanisms of action- health-related outcomes.

After developing an initial understanding of each case, systematic comparisons were conducted. Key theoretical propositions distilled from the literature were treated as preliminary patterns and matched against the empirical evidence observed in each case for testing and refinement. By comparing similarities and differences across cases, a typology was constructed—for example, distinguishing between efficiency-oriented and experience-oriented corridor types, or between public network-based and corporate enclave-based green space systems.

To ensure the robustness of the findings, the principle of triangulation was applied throughout the analysis. For any key conclusion, evidence was sought from at least two different types of sources. This approach helps mitigate single-source bias and enhances the credibility of the research findings.

This study employs purposive sampling in case selection, and therefore its conclusions have limited statistical generalizability. However, the aim of the research is analytical generalization: by conducting in-depth, mechanism-oriented analyses of these representative and diverse cases, the study seeks to reveal the key tensions, synergistic elements, and design logics that commonly arise in planning the commuting-office green space continuum. The theoretical propositions and analytical framework developed here may serve as diagnostic tools and sources of inspiration

for cities in similar contexts and can be tested through future large-sample empirical studies.

4 Result

4.1 Key Synergistic Mechanisms

Cross-case comparisons indicate that an effective commuting–office green space continuum does not rely on any single element; rather, it requires a synergistic system composed of spatial connectivity, policy support, and perceptible benefits. This study conceptualizes this configuration as the golden triangle mechanism for promoting green and healthy commuting.

Seamless and safe physical connectivity.

This constitutes the physical foundation for activating use behaviors. Successful cases consistently demonstrate exceptionally high-quality connectivity. For example, Copenhagen’s bicycle superhighways address core concerns of safety and convenience through full physical separation from motor traffic, a continuous and interruption-free network, and direct connections to office districts. Similarly, the CBD segment of Singapore’s ABC Waters Program achieves zero-distance integration between waterfront greenways and the central business district building clusters. By contrast, certain sections of New York’s High Line Park suffer from access bottlenecks, and its primarily recreational orientation conflicts with peak-hour commuting demands, which to some extent limits its function as a commuting corridor.

Reliable and consistent policy signals.

Physical infrastructure must be underpinned by long-term policy commitments in order to translate into stable commuting habits. Copenhagen’s decades-long, comprehensive bicycle-first policy framework—including investment, tax incentives, and planning integration—has conveyed clear priority signals to residents. Singapore, meanwhile, has embedded the ABC Waters Program within its national top-level sustainability strategy, ensuring sustained resources and political support. Isolated corridors lacking complementary soft policies, such as supporting parking facilities, shower amenities, or employer-based incentives, often struggle to fully realize their commuting potential.

Perceptible immediate and long-term benefits.

Users need to clearly perceive the benefits of changing their commuting modes. Immediate benefits include the predictability of travel time and pleasurable en-route experiences. Long-term benefits are associated with improvements in personal health and social recognition. For instance, studies of Tokyo’s Marunouchi area indicate that running commutes through the Imperial Palace Outer Gardens have become a way for some professionals to construct an identity centered on health and self-discipline.

4.2 Core Patterns at the Planning-Intervention Level

Dominant Types of Commuting Corridors

Cross-case comparisons reveal two dominant logics of planning intervention.

Efficiency-oriented corridors are explicitly designed with the goal of fast commuting. The core interventions focus on enhancing commuting efficiency and safety. Routes are typically straight, with gentle gradients and highly functional service facilities. Their health-promotion pathway is direct, and they achieve high modal share for commuting; however, their usage during non-commuting periods is relatively low.

Experience-oriented corridors prioritize the optimization of landscape quality and recreational experience. Design emphasizes landscape diversity and leisure-oriented features, with winding paths, viewing platforms, and art installations. Their health benefits are more concentrated on psychological restoration and area revitalization, making them powerful tourism and leisure destinations. However, their commuting function is comparatively weak, and conflicts between pedestrians and commuters may arise during peak hours.

Integration Models of Green Spaces in Office Districts

Central radiation model builds around large central green spaces, offering irreplaceable visual openness and symbolic value. However, physical accessibility is constrained by “last-mile” challenges. Such spaces function more as destinations for lunchtime stress relief and social interaction rather than as unavoidable components of daily commuting. Their primary value lies in enhancing overall environmental quality and generating rental premiums across the district. Embedded integrated model, such as Tokyo’s Roppongi Hills and Shenzhen’s Upper Hills, vertically integrates green spaces, corridors, and buildings, creating exceptionally high frequencies of daily contact and convenience. This model significantly enhances employees’ restorative experiences during lunch breaks and opportunities for informal interaction. However, its contribution to promoting long-distance green commuting between residence and workplace is limited; it primarily addresses green needs during workplace intervals.

The Fundamental Divide Between Public Systems and Private Domains

Public systems derive their core strengths from network effects and social equity. They serve broader populations and multiple purposes but require complex multi-stakeholder coordination and face ongoing challenges related to maintenance and safety.

Corporate enclaves excel in their high degree of controllability, integrity, and service quality. Such campuses can deliver near-perfect environments and strongly shape employee behavior through corporate culture. However, this represents an exclusive form of benefit provision; the model is difficult to replicate in the public realm and may further blur the boundaries between employees’ work and personal lives.

4.3 A Paradigm Shift from Destination to Path

This study finds that the most effective way to promote sustainable commuting behavior is not to treat large green spaces as the endpoint of commuting, but rather to transform high-quality green spaces into the path along which commuting itself takes

place. Successful cases essentially “parkify” commuting routes, turning the commuting process into an enjoyable experience.

By contrast, when green spaces function merely as destinations adjacent to workplaces—as is the case with many traditional CBD parks—their primary roles are to enhance well-being and increase real estate value, while their influence on changing commuting modes remains indirect and limited. Converting high-quality green spaces into the paths of commuting behavior, rather than treating them solely as workplace-adjacent destinations, can more directly and effectively facilitate shifts toward healthy commuting behaviors and embed health benefits into everyday routines.

5 Discussion

5.1 Theoretical Dialogue

Based on the analysis of the above case evidence, we propose the following contextualized extension of the existing classical theory.

First, built environment–behavior theories require further refinement. The classic “5D” dimensions of the built environment—density, diversity, design, destination accessibility, and distance to transit—prove insufficient for explaining green commuting behavior. Two key mediating variables warrant particular attention: the primacy of perceived safety and the independent role of route quality. In cycling and walking commutes, physical separation from motor traffic is more decisive than merely short distance or destination accessibility. This finding supports and refines a safety-first behavioral decision model. Moreover, the design dimension should be expanded from street-level aesthetics to encompass the sensory experience and functional continuity of the entire commuting route. A path that is visually, acoustically, and even olfactorily pleasant, and free of interruptions, can itself become an attractor for commuting rather than a neutral medium connecting two points. This requires theoretical models to treat the route itself as an independent variable with intrinsic quality attributes.

Second, the scale of green space equity must be reconsidered. Green space equity involves inherent multi-scalar tensions. At the macro scale, Copenhagen’s bicycle network demonstrates a high degree of social equity by serving the entire population. At the micro scale of corporate campuses, however, Apple Park delivers unparalleled green quality but represents a form of privilege-based equity grounded in employment relationships. This raises a profound ethical and practical question: how should the public sector provide universal green infrastructure while responding to competition from more attractive yet exclusionary green enclaves created by private capital? This issue points to a theoretical frontier concerning the tension between New Urbanism and corporate urbanization.

Third, greater emphasis should be placed on the contextual application of restorative environment theory. While research has established the restorative benefits of green spaces, this study clarifies the primary contexts in which these effects occur. For office workers engaged in high-intensity cognitive labor, short-duration,

high-frequency, and convenient exposure is more effective in alleviating everyday attentional fatigue than occasional visits to large parks. This supports the importance of micro-breaks and everyday nature contact, extending restorative environment theory from a destination-oriented framework toward one embedded within the flows of daily life.

5.2 Practical Implications: From Paradigms to Tools

There is no single best model in urban planning. Instead, planners must seek a strategic balance among commuting efficiency, leisure experience, and ecological value, calibrated to local contexts. The first question planners should ask is: “What is the primary strategic objective of this green corridor?” Is it to shift commuting modes, improve public health, enhance ecological connectivity, stimulate economic revitalization, or pursue a combination of these goals?

For objectives aimed at directly reducing automobile commuting, priority should be given to investing in safe, continuous green transport infrastructure that connects residential areas with employment centers, supported by a comprehensive package of incentive policies. By contrast, for objectives focused on enhancing office-district vitality and employee well-being, emphasis should be placed on embedding high-quality, easily accessible vertical green spaces and social areas within high-density developments.

Attempts to use a single facility to satisfy all objectives often result in weakened core functions. A trunk–branch network strategy is therefore recommended: constructing a limited number of efficient, continuous green commuting trunks, connected to a broader set of leisure and experiential branch networks thereby achieving functional complementarity. Connectivity outweighs sheer size—ensuring zero-friction access between green corridors and office entrances, transit hubs, and residential areas is more important than simply increasing the total area of green space.

For corridors intended to encourage active commuting, safe physical segregation is essential rather than an optional design feature. Clear differentiation of priority functions along different segments—through signage systems, surface materials, and facility provision—can reduce user conflicts. On the corporate side, employers should provide bicycle parking, subsidize shower facilities, and implement green commuting allowances. At the individual level, cycling training programs, safety insurance schemes, and app-based point reward systems are advisable. At the city level, green corridor networks should be fully integrated into overall transport master plans, with guaranteed long-term maintenance funding.

5.3 Research Limitations and Future Directions

Limitations of Research Scope

This study is based on secondary data and purposive sampling; therefore, caution is required when generalizing its conclusions. The main limitations include geographic

and cultural bias in case selection, a focus on successful cases, and constraints on the depth of causal inference.

With respect to geographic and cultural representativeness bias, the cases selected in this study are all highly developed global or regional hub cities. These cities typically possess relatively abundant fiscal resources, mature governance capacities, and high levels of public environmental awareness. Consequently, the findings and conclusions must be applied with particular caution when extended to rapidly urbanizing cities, small and medium-sized cities, or regions with limited fiscal capacity. Such contexts may face more severe challenges related to land ownership, infrastructure investment, and long-term maintenance and management.

Regarding bias toward "successful" or well-known cases, case selection followed principles of theoretical sampling and maximum variation, which helps reveal underlying mechanisms but inevitably favors projects that have gained international visibility and are relatively "successful" or iconic. This may result in insufficient coverage of failed, underreported, or less effective green corridor practices, potentially leading to an underestimation of the complexity of the conditions required for success.

In terms of the focus on specific occupational groups and commuting patterns, this study primarily examines office-based knowledge workers and their commuting behaviors. This group generally exhibits stronger preferences for green and healthy lifestyles and more regular commuting patterns. However, cities also contain large numbers of workers in the service and manufacturing sectors, whose working hours, commuting routes, and demands for green space may differ substantially. The applicability of the findings to populations with non-standard work schedules or to lower-income commuting groups requires further verification.

With regard to the challenges of depth and balance in interdisciplinary integration, the research spans multiple disciplines, including urban planning, transport engineering, environmental psychology, public health, and landscape design. While striving for comprehensiveness, trade-offs in theoretical depth within each discipline were unavoidable. For example, the discussion of "restorative environments" in environmental psychology may not fully capture the latest theoretical developments, and quantitative models of level of service in transport engineering were not explored in depth.

Finally, concerning the rapidly evolving nature of the research frontier, urban green infrastructure is a fast-developing field, particularly in areas such as nature-based solutions, integration with smart city technologies, and climate change adaptation. Although the literature review attempts to capture recent trends, a certain degree of lag is inevitable.

Future Research Directions

Future studies should conduct longitudinal tracking research to quantify the long-term health and economic benefits of green corridor continua. By following fixed populations before and after the construction of new corridors, researchers can more precisely measure behavioral change and associated health outcomes.

Mixed-method approaches should be employed to more deeply investigate management mechanisms and cultural influences in private domains such as corporate

campuses, and to quantify economic value. Further research should examine the specific impacts of green corridors on surrounding office rents, corporate recruitment attractiveness, and employee productivity, providing more robust cost–benefit evidence for investment decisions. The potential of mobile apps, shared bicycle/scooter data, and wearable device data in monitoring corridor usage, optimizing management, and delivering personalized incentives should also be explored.

Finally, the applicability of this framework should be tested and extended in high-density, resource-constrained contexts, particularly in cities of the Global South. In rapidly urbanizing cities with active informal economies, future research should explore feasible models of green commuting corridors in high-density environments and critically examine the associated challenges of social equity.

6 Conclusion

Through an in-depth comparison of multiple global cases, this study demonstrates a central argument: urban green spaces must shift from being viewed as static destinations or landscapes to functioning as dynamic, high-quality everyday pathways and system services. By harnessing the cumulative, temporal effects of health benefits derived from regular exposure to nature, such spaces can generate more substantial and sustainable health-promoting outcomes.

The key to success does not lie in the perfect replication of a single model, but in a deep understanding of the core tensions embedded in local contexts—such as efficiency versus experience, equity versus privilege, and the public versus the private—and in addressing these tensions through the synergistic design of space, policy, and perceived benefits. In doing so, green infrastructure can be organically woven into the city’s functional networks and the rhythms of residents’ daily lives. This is not merely a technical challenge, but a matter of governance wisdom and value choices that shape how we define the quality of urban life in the future.

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