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Urban Green Infrastructure, Travel Choices, and Sustainable Mobility: A Systematic Review

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ABSTRACT

Urban green infrastructure and the wider built environment jointly shape travel choices, yet evidence is distributed across green-space, active-travel, accessibility, and travel-demand research. This systematic review re-audited a Scopus RIS export dated 19 November 2025 and supplementary citation records using PRISMA 2020, restricting eligibility to studies published between 2021 and 2025. The identification stage contained 249 records (215 from Scopus and 34 from citation checking); after two duplicates were removed, 247 titles and abstracts were screened, 70 full texts were assessed, 43 were excluded, and 27 primary studies were synthesized. A study-level matrix coded geography, design, environmental exposure, mobility outcome, direction of evidence, and methodological quality. The sample comprised 10 quantitative studies (37.0%), 16 mixed-methods or spatial-modeling studies (59.3%), and one qualitative or policy study (3.7%). Europe contributed nine studies, Asia 12, North America four, and Oceania two, with no included study located in Africa or Latin America. Eighteen studies reported supportive associations, six reported conditional or mixed associations, and three provided weak or indirect evidence. Greenways, street greenery, walkable urban form, destination accessibility, and integration with transit or shared mobility were most consistently associated with active and sustainable travel when connected to daily travel networks, whereas evidence for direct reductions in motorized travel distance remained limited. The synthesis traces a pathway in which planning shapes environmental inputs, those inputs influence travel through accessibility, comfort, safety, and route quality, and observed travel outcomes in turn inform subsequent investment, design, and maintenance decisions.

INTRODUCTION

Cities today are expanding faster than the systems meant to serve them. Rapid urbanization has intensified the need for urban systems that support mobility, climate adaptation, public health, and equitable access (Rui & Othengrafen, 2023; Allam & Sharifi, 2022). As streets fill and neighborhoods grow denser, the way people move through a city becomes inseparable from how liveable that city actually feels. (Wang et al., 2023).

Urban green infrastructure is increasingly positioned as a climate-adaptation and spatial-planning instrument, yet its mobility value depends heavily on how it is woven into land use and transport systems (Ramyar et al., 2021). A park or a green corridor that sits disconnected from daily routes rarely changes how people travel, its usefulness begins where planning decisions bring it within reach of everyday journeys (Lin et al., 2023; Goel & Vishnoi, 2022).

Travel behavior is shaped by density, diversity, and design, and just as strongly by the environmental quality of the routes and destinations people encounter along the way (Rahman & Sciara, 2022; El-Didy et al., 2024). Parks, greenways, street trees, public spaces, and other green or blue-green elements can change how comfortable, continuous, safe, and attractive a journey feels, while the underlying land-use and transport networks determine whether those elements can actually be used for daily travel rather than admired from a distance (Alipour & Dia, 2023; Kalfas et al., 2023; Raza et al., 2022).

Despite this shared ground, empirical evidence still sits across two literatures that rarely speak to each other. Green-space studies tend to focus on exposure, recreation, health, or perception, while transport studies concentrate on trip generation, accessibility, mode choice, shared mobility, and travel demand. Each tradition captures something real, yet neither alone explains how a green element changes a trip from start to finish.

Travel satisfaction remains a central part of the broader travel-behavior process, and residential self-selection complicates any attempt at causal attribution, since the attitudes and preferences that lead someone to choose a neighborhood may also shape how they travel once they live there (Guan et al., 2020). This overlap is visible in the Scopus evidence base itself. Many records treat greenery as one ingredient within a composite built-environment or accessibility measure rather than studying it as a stand-alone intervention.

Previous systematic reviews have offered valuable but narrower syntheses of this space. Koc et al. (2017) classified green-infrastructure typologies, reviewed physical-activity interventions in urban green space, examined multifunctionality in green-infrastructure planning, and traced the links between green stormwater infrastructure and active mobility. Each review stops at the edge of its own theme. None follow direct green exposures and broader built-environment characteristics together through the full chain of trip generation, destination choice, mode choice, active travel, shared-mobility integration, travel satisfaction, and the motorized demand that follows downstream.

More recent work signals where this integration is beginning to take shape on the ground. Liu et al. (2024), Drawing on a public participatory GIS survey with residents in Copenhagen alongside interviews with Danish planners, the study examined how urban green travel environments are perceived and planned, and identified infrastructure design and management, balance with other green-space functions, collaboration, and public awareness as the factors that most shaped planning outcomes, with lack of space and budget standing out as the main barriers. Their study is one of the few to place residents and planners side by side, showing that green travel environments are negotiated through everyday politics as much as through design.

On the transportation side, Zawawi et al. (2023) conducted a systematic review of studies published between 1991 and 2021 on greenway usage for active transportation, and found that where a greenway sits, how well it connects to daily destinations, and how safe and well maintained it feels consistently shaped whether it functioned as a commuting route rather than a recreational one. Their review also flagged how thin the evidence base still is for many of these influences, with most of the variables they identified resting on low or very low certainty of evidence.

These two strands of recent evidence point to the same unresolved space this review sets out to address. Planning factors matter, and route and destination qualities matter, yet no synthesis has traced both threads together across the full journey from green exposure to travel outcome, at a scale broad enough to compare geographies and study designs.

This gap carries real urgency, as cities continue to densify and climate pressures mount, planners need evidence that connects green investment directly to travel behavior rather than treating the two as separate policy tracks. The novelty of this review lies in bringing direct green exposures and broader built-environment characteristics into a single framework, one that follows their influence through accessibility, comfort, safety, and route quality rather than treating green infrastructure as an isolated amenity. This review therefore aims to synthesize evidence on how urban green and built-environment characteristics shape travel choices, and to trace the mechanisms through which these characteristics influence accessibility, comfort, safety, and route quality, so that planning can be understood as both an antecedent and a feedback response within the travel-behavior process.

RESEARCH METHODS

This review followed PRISMA 2020 for identification, screening, eligibility assessment, and reporting (Page et al., 2021). During revision, the evidence base was re-audited against the Scopus RIS export, the references in the submitted manuscript, and explicit eligibility criteria. The unit of analysis was a peer-reviewed primary empirical journal article. Each included study was coded for location, world region, design, green or built-environment exposure, mobility-related outcome, principal finding, direction of evidence, and quality score, with studies identified throughout by conventional author–date citation.

Scopus was the principal database, with the RIS export containing 215 English-language journal-article records. Additional records were recovered from the bibliography of the submitted manuscript and backward citation checking. Searches and screening covered titles, abstracts, and keywords using the syntax: TITLE-ABS-KEY ("green infrastructure" OR "urban green space" OR "street tree canopy" OR "greenway" OR "green corridor") AND ("trip generation" OR "travel behavior" OR "mode choice" OR "walking" OR "cycling" OR "VMT") AND ("sustainable transport" OR "urban planning" OR "transport policy" OR "urban mobility"). The time frame covered publications from 2021 to 2025, selected to capture the most recent literature on green infrastructure and built-environment travel-demand research available at the time of manuscript preparation.

Eligible studies were primary empirical journal articles examining an urban green, natural, public-space, land-use, accessibility, or built-environment exposure in relation to an empirically assessed mobility-related outcome (trip generation, destination choice, walking, cycling, mode choice, transit or shared-mobility access, travel satisfaction, greenway or public-space use, route-level walkability or active-mobility suitability, motorized travel demand, or transport–land-use integration outcomes). Reviews, guidelines, conceptual papers, ecological-only studies, non-urban recreational studies without urban-mobility relevance, and studies without an extractable mobility-related or transport-planning outcome were excluded. Direct travel-behavior outcomes were distinguished from accessibility, route-use, and planning outcomes, with the latter interpreted more cautiously. The criteria are presented in **Table 1.**

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Table 1. Inclusion and Exclusion Criteria

Criterion	Inclusion	Exclusion
Publication type	Peer-reviewed primary empirical journal articles using quantitative, qualitative, mixed, longitudinal, modeling, or spatial designs.	Reviews, meta-analyses, guidelines, editorials, conceptual papers, proceedings, books, and grey literature.
Exposure and outcome	Urban green or natural environment, public space, urban form, accessibility, or land-use exposure linked with an	Ecological or design functions without an extractable mobility-related or transport-planning

Criterion	Inclusion	Exclusion
	observable travel, mobility, accessibility, travel-demand, route-use, or empirically assessed transport-planning outcome.	outcome; environmental exposure or relevant outcome not extractable.
Language and period	English; January 2021–November 2025.	Non-English or outside the review period.
Spatial context	Urban, metropolitan, neighborhood, street, corridor, park, or route contexts.	Rural-only or non-urban recreational contexts without identifiable urban-mobility, accessibility, or transport-planning relevance.

The identification stage contained 249 records, 215 from the Scopus export and 34 from supplementary citation checking. After two duplicates were removed, 247 records underwent title and abstract screening, of which 177 were excluded, leaving 70 full-text reports assessed for eligibility. Of these, 43 were excluded: review, conceptual, or guideline publications (n = 16); no qualifying mobility-related or transport-planning outcome (n = 4); no qualifying environmental exposure (n = 3); a non-urban recreational context without identifiable urban-mobility relevance (n = 1); a travel-intention outcome outside the scope of the review (n = 1); and publications outside the 2021–2025 review period (n = 18). The final synthesis included 27 primary studies (Figure 1), comprising eight direct green or natural-environment studies, 13 built-environment or accessibility studies, and six studies of shared mobility, integrated transport, or public-space planning.

Data extraction recorded bibliographic information, city or country, region, design, exposure category, mobility-related outcome, principal finding, evidence direction, and quality score, with the full characteristics and study-level coding documented in Supplementary Table S1. Quality appraisal used five domains scored 0-2 each, namely clarity of the research question, validity and relevance of the exposure measure, appropriateness of design, data, and analysis, clarity of the mobility outcome, and transparency of interpretation and limitations, yielding total scores of 0-10 categorized as high (8-10), moderate (5-7), or low (0-4) quality, applied by one assessor in two passes with disagreements resolved by retaining the more conservative score.

Descriptive analysis summarized method, region, exposure group, outcome, evidence direction, and quality, while thematic synthesis traced four linked domains, namely planning and urban context, environmental inputs, mediating mechanisms, and travel outcomes. Author-date citations identify the included studies throughout, with the corresponding study-level records documented in Supplementary Table S1. For multi-country studies spanning more than one world region, the region was assigned according to the primary analytical setting reported in the study. Evidence direction was coded as supportive when the principal association favored active or sustainable mobility, conditional or mixed when effects varied by context or subgroup, and weak or indirect when mobility evidence was limited or not directly attributable to the exposure.

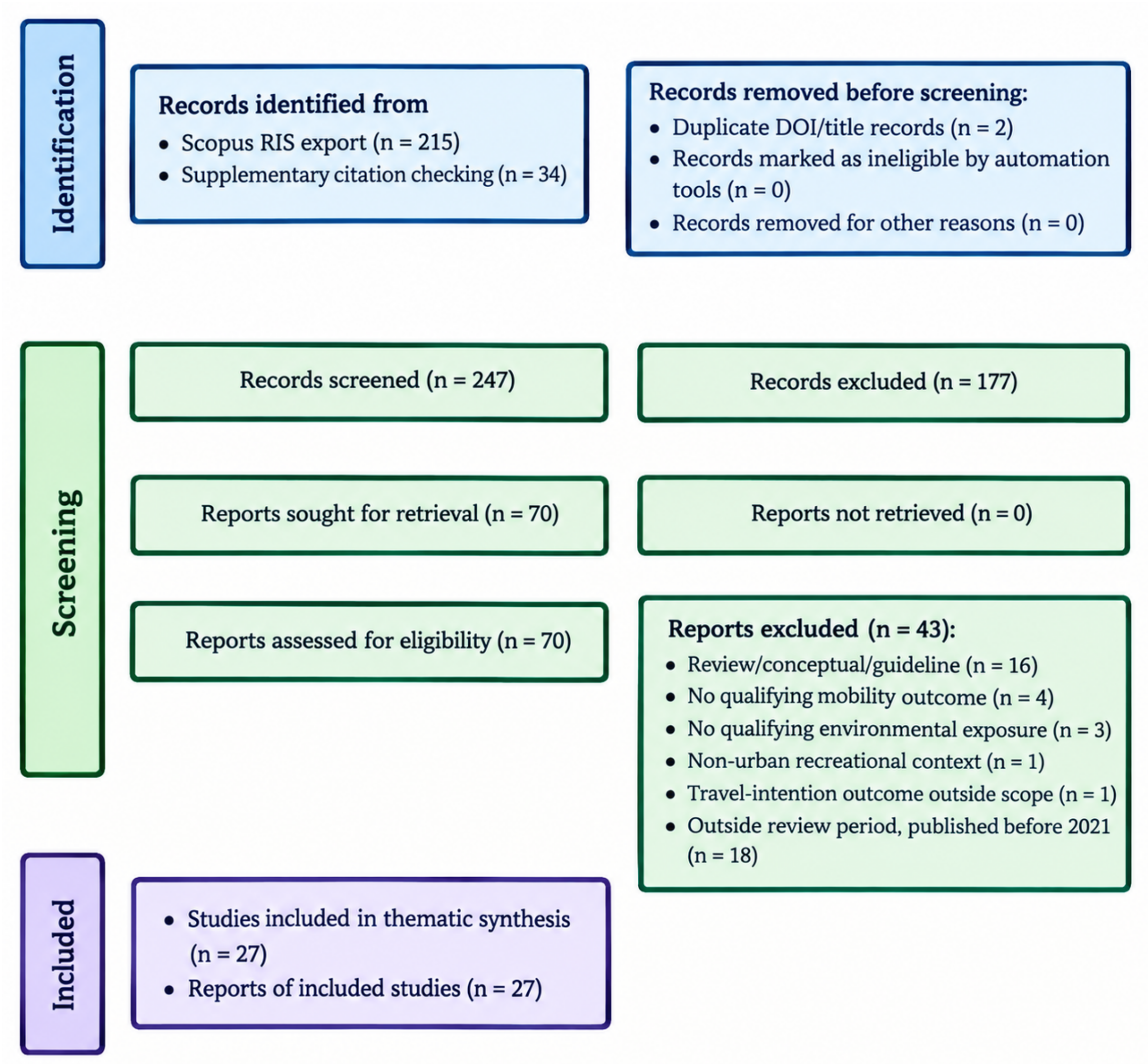

Figure 1. Revised PRISMA 2020 flow diagram based on the attached Scopus export and supplementary citation records.

RESULTS AND DISCUSSION

Thematic Summary of Evidence by Exposure Group

Thematic synthesis across the 27 included studies traced four interlinked domains, planning and urban context, environmental inputs, mediating mechanisms, and travel outcomes. Table 2 summarizes the evidence pattern within each exposure group, including the dominant methodological approach, the principal mediating mechanism, and the predominant direction of evidence toward active or sustainable mobility.

Table 2. Summary of Evidence by Exposure Group

Exposure Group	Dominant Methodological Approach	Principal Mediating Mechanism	Mobility Outcomes Measured	Predominant Evidence Direction	Authors
Direct green/ natural-environment	Behavioral surveys and statistical models based on green-space	Green-space accessibility and quality as a driver of walking,	Walking, cycling, greenway use, travel satisfaction	Mostly supportive, with some conditional effects by age	Adamu et al. (2023); Audate et al. (2024); Dawson et al. (2023); Liu et al. (2024); Ottoni et al.

	exposure	cycling, and greenway use		group or local context	(2021); Psara et al. (2023); Ta et al. (2021); Vatanparast et al. (2024)
Built-environment/ accessibility	Spatial modeling (GIS, machine learning, integrated land-use–transport accessibility models)	Density, street-network connectivity, and mixed land-use patterns as determinants of mode choice and trip generation	Mode choice, trip generation, walkability, time-based accessibility	Mixed between supportive and conditional, depending on spatial scale and urban context	Charreire et al. (2021); Ki et al. (2023); Wu et al. (2021); Zhou et al. (2025); Liu et al. (2025); Nourmohammadi et al. (2025); Feng et al. (2025); Dong et al. (2025); Santos et al. (2024); Kheyrabadi & Mamdoohi (2024); Goh et al. (2023); Raza et al. (2022); González-González et al. (2022)
Shared-mobility/ integrated transport & public-space planning	Spatiotemporal pattern analysis and case studies of shared-bike or transit systems	Modal integration and public-space design as facilitators of the shift toward sustainable transport	Shared-bike usage, transit integration, first/last-mile travel patterns	Generally supportive, with some indirect (weak) evidence on public-space design aspects	Moore et al. (2025); Xiao et al. (2025); Du et al. (2024); Yang et al. (2023); Fatima et al. (2022); Chen & Jiang (2022)

(Source: Authors' synthesis based on the 27 included studies documented in Supplementary Table S1)

According to Table 2, the green-space exposure group shows a fairly consistent link to active-mobility activity, with walking and cycling frequency rising alongside greenway accessibility and perceived green-space quality (Adamu et al. 2023; Dawson et al. 2023; Ottoni et al. 2021; Ta et al. 2021). Several studies within this group report conditional patterns, where the strength of association varies by age group, seasonal context, or the specific type of green infrastructure examined (Audate et al. 2024; Liu et al. 2024; Psara et al. 2023; Vatanparast et al. 2024). The built-environment and accessibility group, comprising the largest number of studies, places greater emphasis on network connectivity, density, and mixed land-use configurations as determinants of mode choice and trip generation, often using spatial or machine-learning models to capture nonlinear relationships between these factors and travel behavior (Zhou et al. 2025; Liu et al. 2025; Nourmohammadi et al. 2025; Feng et al. 2025; Dong et al. 2025).

Findings from this second group also point to accessibility-based mechanisms operating independently of green-space presence, such as walkability indices, time-based transit accessibility, and origin-attribute effects on destination choice (Ki et al. 2023; Santos et al. 2024; Kheyrabadi & Mamdoohi, 2024; Raza et al. 2022; González-González et al. 2022). The shared-mobility and public-space integration group shows a comparatively consistent evidence direction, with modal integration and infrastructure design linked to increased first/last-mile connectivity and shared-mobility uptake (Moore et al. 2025; Xiao et al. 2025; Du et al. 2024; Chen & Jiang, 2022). A smaller subset of studies in this group reports indirect or weaker evidence, particularly where public-space design outcomes are assessed through demand estimation or accessibility indices rather than direct behavioral measurement (Yang et al. 2023; Fatima et al. 2022).

Study Selection and Methodological Profile

The methodological composition of the 27 included studies reflects a strong reliance on spatial and computational modeling approaches, alongside a smaller share of direct quantitative and qualitative designs. Table 3 summarizes the distribution of studies across three method groups and their respective analytical contributions to the synthesis.

Table 3. Methodological Profile of Included Studies

Method Group	Number	Percentage	Analytical Contribution
Quantitative	10	37.0%	Associations, longitudinal change, trip generation, mode choice, and demand estimation
Mixed/spatial modeling	16	59.3%	GIS, network accessibility, machine learning, integrated land-use–transport models, and mixed evidence
Qualitative/policy	1	3.7%	Safety perceptions, constraints, and user-experience interpretation

(Source: Authors' classification based on the methodological approach reported in each of the 27 included studies)

According to Table 3, the quantitative group draws primarily on survey-based and statistical-association designs, capturing direct relationships between exposure and travel outcomes such as walking, cycling, and mode choice (Adamu et al., 2023; Ta et al., 2021; Charreire et al., 2021; Kheyrabadi & Mamdoohi, 2024; Goh et al., 2023; González-González et al., 2022; Fatima et al., 2022). These studies tend to rely on established regression or index-based approaches to quantify the strength and consistency of associations between environmental exposure and mobility behavior, offering more directly interpretable but less spatially granular evidence than the modeling-heavy group.

The mixed/spatial-modeling group is the largest, reflecting the field's growing reliance on GIS, machine learning, and integrated land-use–transport frameworks to capture nonlinear and spatially heterogeneous relationships (Ki et al., 2023; Zhou et al., 2025; Liu et al. 2025; Nourmohammadi et al., 2025; Feng et al., 2025; Dong et al., 2025; Santos et al., 2024; Raza et al., 2022; Moore et al., 2025; Xiao et al., 2025; Du et al., 2024; Yang et al., 2023; Chen & Jiang, 2022; Vatanparast et al., 2024; Audate et al., 2024; Dawson et al., 2023). Studies in this group frequently combine multiple data sources, such as street-view imagery, GPS trajectories, or origin–destination flows, with advanced analytical techniques including XGBoost, multiscale geographically weighted regression, and dynamic Bayesian networks to model threshold effects and context-dependent associations that simpler linear approaches would miss.

The qualitative/policy group is represented by a single study focused on safety perceptions among older adults using urban greenways by Ottoni et al. (2021), which contributes experiential and contextual insight into barriers to active mobility that quantitative measures alone do not capture.

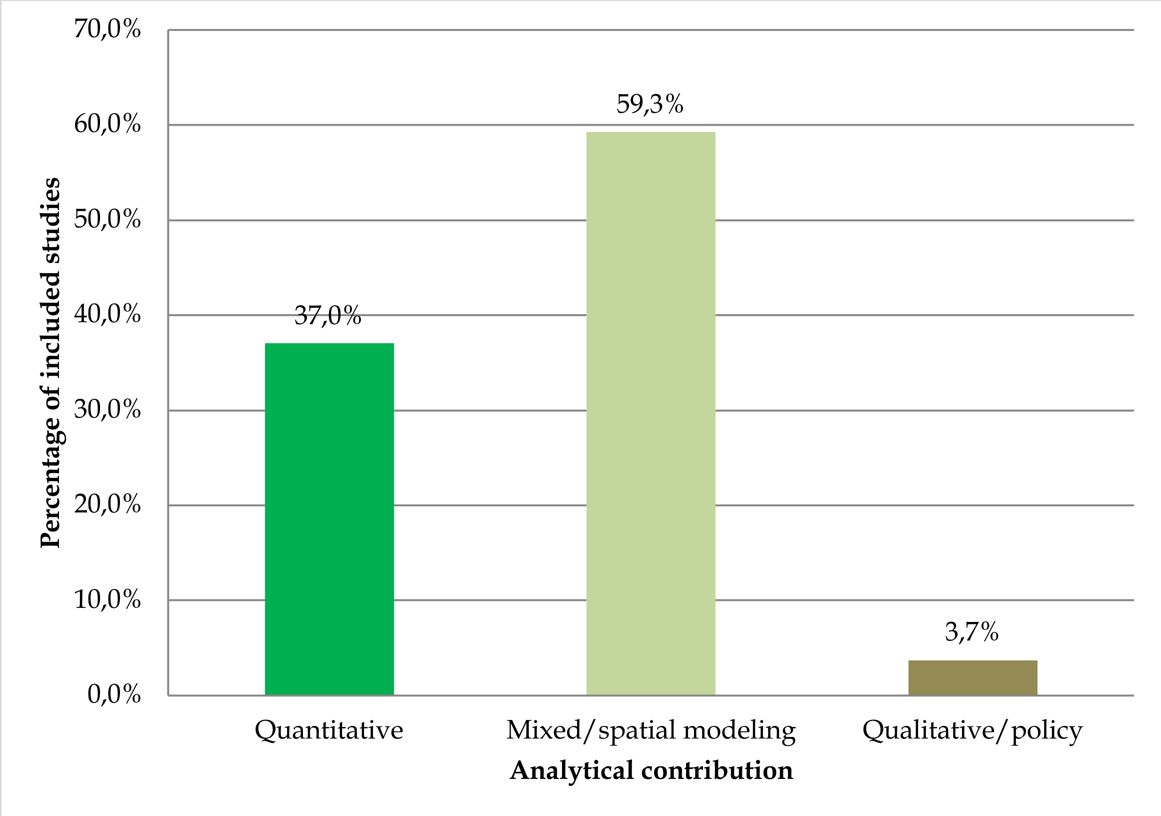

Figure 2. Methodological distribution of the 27 included studies.

Geographic Distribution and Transferability

The evidence base draws primarily from Europe and Asia, with more limited representation from North America and Oceania, and no included study located in Africa or Latin America. Table 4 summarizes the distribution across world regions along with the dominant thematic emphasis observed in each.

Table 4. Geographic Distribution of Included Studies

Region	n	Percentage	Dominant Thematic Emphasis	Representative Studies
Europe	9	33.3%	Greenways, cycling, walkability, and integrated planning	Adamu et al. (2023); Dawson et al. (2023); Liu et al. (2024); Psara et al. (2023); Charreire et al. (2021); Zhou et al. (2025); Santos et al. (2024); González-González et al. (2022); Moore et al. (2025)
Asia	12	44.4%	Dense-city context, bikeshare systems, accessibility, and spatial modeling	Ta et al. (2021); Wu et al. (2021); Dong et al. (2025); Kheyrabadi & Mamdoohi (2024); Goh et al. (2023); Xiao et al. (2025); Du et al. (2024); Yang et al. (2023); Chen & Jiang (2022); Vatanparast et al. (2024); Ki et al. (2023); Liu et al. (2025)
North America	4	14.8%	Residential self-selection, greenway safety, and land-use integration	Audate et al. (2024); Ottoni et al. (2021); Raza et al. (2022); Feng et al. (2025)

Oceania	2	7.4%	Time-based accessibility and demand estimation	Nourmohammadi et al. (2025); Fatima et al. (2022)

(Source: Authors' synthesis based on the 27 included studies)

The geographic pattern observed across the 27 included studies is not merely a demographic footnote but a substantive feature of this evidence base, since it shapes what the synthesis can and cannot claim about the relationship between environmental exposure and mobility outcomes. One notable characteristic of this review is that it deliberately widened its scope beyond direct green-infrastructure research to also capture built-environment, accessibility, and shared-mobility studies.

This broadening turns out to correlate closely with geography, the built-environment and spatial-modeling literature, which forms the largest share of the sample, is disproportionately produced in Asian megacity contexts where dense urban form and rapid technological adoption make GIS-based and machine-learning methods especially attractive, while the more classically green-infrastructure-oriented studies cluster in Europe, where greenway networks and integrated planning traditions are longer established. This divergence suggests that the choice of exposure category in urban-mobility research is not geographically neutral, but instead tracks the maturity of each region's planning infrastructure and data ecosystem. Several further patterns stand out from this distribution:

a) Europe and Asia together account for two-thirds of the evidence base, reflecting the concentration of mature transport-planning and spatial-modeling research capacity in these regions (Adamu et al., 2023; Ta et al., 2021).
b) European studies more often center on greenway access, cycling behavior, and integrated urban planning across multiple national aspects (Dawson et al., 2023; Charreire et al., 2021; Moore et al., 2025).
c) Asian studies more frequently apply spatial and machine-learning methods to dense-city accessibility, bikeshare demand, and destination choice, consistent with rapid urbanization and high-density built environments (Kheyrabadi & Mamdoohi, 2024; Xiao et al., 2025; Chen & Jiang, 2022).
d) North American and Oceanian evidence, though smaller in volume, contributes distinct methodological angles, including residential self-selection and greenway safety perceptions and time-based accessibility modeling (Ottoni et al., 2021; Raza et al. 2022 Nourmohammadi et al., 2025; Fatima et al., 2022).
e) No included study was located in Africa or Latin America, a gap that limits transferability to lower-income and rapidly urbanizing contexts characterized by different climates, street-management systems, levels of informality, and transport supply.

These patterns point to a deeper structural feature of the field rather than a simple sampling artifact. The geography of published evidence appears to follow the geography of urban data infrastructure and research funding, not the geography of where green-mobility interventions might matter most. Cities in Africa, Latin America, and much of South and Southeast Asia are undergoing some of the fastest urbanization and motorization transitions in the world, yet they are almost entirely absent from the primary evidence synthesized here, which means the mechanisms this review identifies, such as the mediating role of network connectivity or greenway accessibility, have been validated almost exclusively in relatively data-rich, higher-income, or rapidly digitizing urban contexts.

This geographic concentration should therefore be treated as an evidence gap rather than as evidence of limited relevance in underrepresented regions, and it is a limitation the discussion returns to when weighing how confidently the synthesized mechanisms can be generalized to cities with different climates, informal transport sectors, and weaker street-management systems.

Green Infrastructure, Mobility, and Sustainable Transportation Planning

Across the 27 included studies, the evidence base leans toward supportive associations between environmental or built environment exposure and sustainable mobility outcomes. Among the direct green or natural environment studies, evidence was generally favorable but context dependent, with greenways and greenspace exposure supporting active travel and travel satisfaction when routes were accessible, continuous, safe, and connected to destinations (Adamu et al., 2023; Dawson et al., 2023; Ottoni et al., 2021; Ta et al., 2021). Functional connectivity emerged as the most consistent mechanism across all three exposure groups. Comparable network effects appeared in the built environment studies, where density, mixed land use, and street configuration shaped walking, cycling, trip generation, and mode choice (Ki et al., 2023; Zhou et al., 2025; Raza et al. 2022). Shared mobility studies linked station use and bicycle demand to urban morphology, transit access, and integrated public space planning (Moore et al., 2025; Du et al., 2024; Chen & Jiang, 2022).

Motorized travel volume was rarely the direct object of measurement in this sample. Where studies did address broader trip generation or mode choice, none established that green infrastructure independently reduced vehicle miles traveled (Charreire et al., 2021; Goh et al., 2023). Instead, motorized travel functioned as a downstream and conditional outcome shaped by land use distribution, destination proximity, and transport supply conditions. Planning integration appeared as both an antecedent and a feedback process, since land use, network design, and transit supply determined where environmental assets were located, while mobility observations in turn informed corridor and station placement (Xiao et al., 2025; Fatima et al., 2022). Equity and governance considerations cut across all three themes, since green or walkable environments may be physically present yet functionally unusable because of insecurity or poor maintenance.

Table 5. Evidence Direction and Planning Implications by Exposure Group

Evidence Group	Studies	Direction of Evidence	Planning Implication
Direct green / natural-environment	8	Supportive: 6; conditional: 2	Connect green assets to daily routes; audit shade, safety, maintenance, and destination access
Built-environment / accessibility	13	Supportive: 8; conditional: 3; weak/indirect: 2	Coordinate density, mixed use, street design, accessibility, and transport supply
Shared mobility and integrated transport / public-space planning	6	Supportive: 4; conditional: 1; weak/indirect: 1	Use demand, accessibility, and stakeholder evidence to locate stations, improve transit links, coordinate public-space investment, and integrate transport with land-use planning
Total	27	Supportive: 18; conditional: 6; weak/indirect: 3	Treat environmental quality as one component of an integrated mobility system

(Source: Authors' synthesis based on the 27 included studies)

The pattern across evidence groups supports a conditional positive interpretation rather than a universal effect. Direct green exposure was associated with sustainable mobility when combined with route continuity and accessible destinations, while broader urban form studies reinforced the same network logic at a larger scale (Vatanparast et al., 2024; González-González et al., 2022). The causal ordering implied by this synthesis runs from planning decisions through route experience and travel satisfaction to eventual behavioral change in mode choice. At street and neighborhood scales, the evidence favors combined interventions pairing greenery with safe crossings and transit connections, rather than (Psara et al., 2023; Santos et al., 2024). At city scale, green and public space indicators should be embedded in accessibility and land use transport appraisal, rather than being evaluated as a standalone category.

Across the 27 included studies, evidence direction was not evenly split. Eighteen studies reported findings that clearly favored active or sustainable mobility, six reported effects that varied by context or subgroup, and three offered mobility evidence that was weak or only indirectly linked to the exposure being measured. This distribution is shown in the following chart.

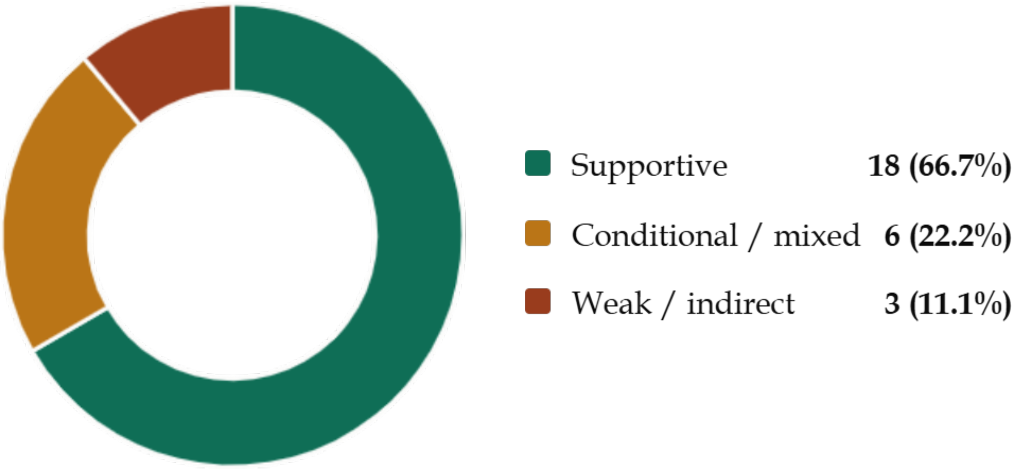

Figure 3. Evidence direction across the 27 included studies

The two-thirds majority of supportive findings should not be read as evidence that green or built-environment exposure directly and unconditionally increases active or sustainable travel. Rather, the supportive studies consistently described a chain of intermediate steps connecting planning decisions to eventual behavior change, with each step capable of weakening or reversing the relationship if a condition along the way was not met. This pathway is shown in the following diagram, with a dashed connector at the final stage marking where the evidence becomes conditional rather than direct.

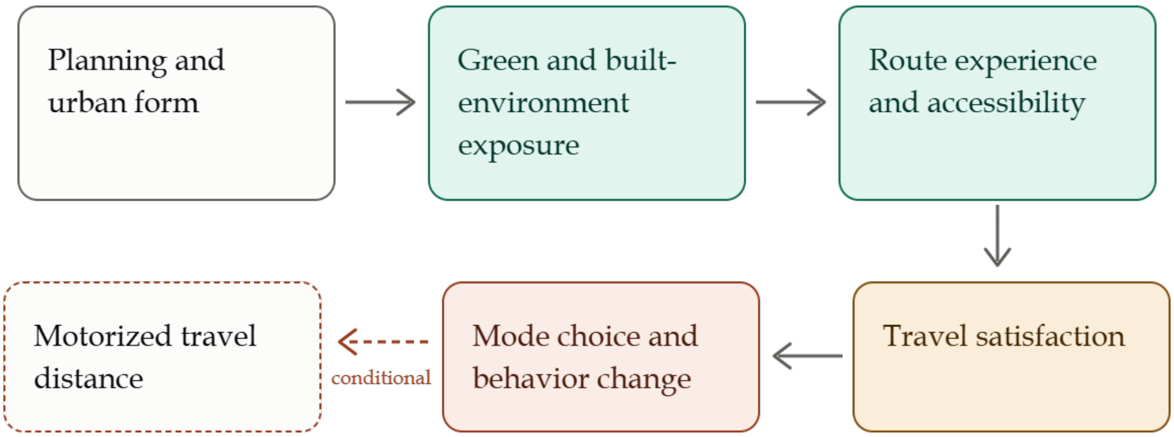

Figure 4. Conceptual pathway synthesized

This mechanism explains why no study in the sample established that green infrastructure independently reduced motorized travel distance. The relationship operates several steps removed from vehicle miles traveled, and each intervening stage, route experience, travel satisfaction, and mode choice, introduces its own dependencies on safety, maintenance, and destination accessibility. Reading the evidence through this staged structure, rather than as a single direct effect, is consistent with the conditional-positive interpretation offered in the thematic synthesis above.

a) Planning and urban form

This element covers the upstream decisions behind land-use allocation, network design, transit supply, and funding, which together determine where green assets and street infrastructure are eventually located. Ki et al. (2023) & Charreire et al., (2021) both trace mobility outcomes back to these planning-level configurations rather than treating environmental features as standalone variables.

b) Green and built-environment exposure

These planning decisions translate into measurable exposure conditions such as greenway coverage, greenspace proximity, and street-level density. Adamu et al. (2023); Dawson et al. (2023); & Zhou et al. (2025) each measured this exposure directly and found that it shaped downstream travel behavior, though the strength of the relationship depended on how the exposure was defined and located.

c) Route experience and accessibility

Exposure on its own did not translate into mobility outcomes unless it also improved the lived experience of a route, including continuity, safety, and connection to destinations. Ottoni et al. (2021) & Raza et al. (2022) also found that accessibility and perceived safety along a route mediated whether green or built-environment features were actually used.

d) Travel satisfaction

Positive route experiences were associated with greater satisfaction during active travel, which several studies treated as a distinct outcome rather than a simple proxy for behavior change. Ta et al. (2021) & Psara et al. (2023) linked satisfaction specifically to green-space quality and accessibility rather than to exposure alone.

e) Mode choice and behavior change

Only once satisfaction and accessibility conditions were met did studies observe actual shifts in mode choice, cycling frequency, or shared-mobility uptake. Wu et al. (2021); Goh et al. (2023); & Chen & Jiang (2022) each documented this behavioral layer, generally treating it as the most direct measurable outcome in the pathway.

f) Motorized travel distance (conditional)

No study in the sample established that green infrastructure independently reduced motorized travel distance. Charreire et al. (2021) & González-González et al. (2022) instead showed that motorized travel responded to land-use distribution, destination proximity, and transport-supply conditions, which is why this final stage is drawn as conditional rather than direct.

Integrating Green Infrastructure, Built Environment, and Mobility within Urban Planning Practice

The synthesis across the 27 included studies indicates that planning and urban context consistently sit upstream of environmental conditions rather than functioning as a separate or later consideration. Charreire et al. (2021) found that land-use policy, transport-network design, governance, safety management, and funding decisions shape where green assets and street infrastructure are located, how well they are connected, and how consistently they are maintained. These upstream conditions then carry through to travel behavior via accessibility, thermal comfort, perceived safety, route quality, and satisfaction, a pattern that Kheyrabadi & Mamdoohi (2024) was also observed when linking origin-level planning attributes to destination choice.

A recurring pattern across the evidence base is that travel outcomes are not simply an endpoint but also feed back into planning through monitoring, demand analysis, and post-implementation evaluation. Raza et al. (2022) documented how observed travel patterns, such as underused corridors or uneven accessibility, prompted subsequent adjustments to design and maintenance priorities. This reciprocal pattern in the evidence complicates any purely linear account of environmental exposure producing mobility outcomes, and instead points to an ongoing cycle in which planning, environmental conditions, and travel behavior continuously inform one another, a dynamic that González-González et al. (2022) is framed explicitly in terms of vertical walking-facility investment responding to observed pedestrian demand.

Within this aspect, the accessibility and behavioral mechanisms identified across the green, built-environment, and shared-mobility evidence groups appear closely intertwined rather than operating as separate explanations for the same outcomes. Ki et al. (2023) showed that a walkability index built from street-level imagery captured much of the same variance in travel behavior that more conventional accessibility measures did, while Santos et al. (2024) reached a comparable conclusion using multi-criteria GIS analysis of road suitability. Studies addressing green-space exposure, network connectivity, and shared-mobility integration each contributed a different layer of the same underlying process, suggesting that urban mobility planning benefits from treating these dimensions jointly rather than evaluating environmental, infrastructural, and behavioral factors in isolation.

The evidence also points to specific gaps in how environmental exposure is typically measured and applied in planning practice. Dawson et al. (2023) Showed that residential proximity to green space, on its own, was a weak predictor of actual travel behavior compared with measures that capture the lived experience of a route, including continuity, shade and thermal comfort, perceived and objective safety, and accessibility to daily destinations. Xiao et al. (2025) & Du et al. (2024) reinforced this point from a shared-mobility angle, finding that bike-sharing uptake tracked more closely with integration into the surrounding transit network than with simple proximity to green or public space, which suggests that proximity-only indicators commonly used in planning appraisal should be supplemented with route- and network-level measures.

The synthesized evidence suggests that green infrastructure delivers measurable mobility benefits primarily when it is embedded within a broader network of pedestrian and cycling connections, transit access, and compact mixed land use, rather than when it is provided as an isolated amenity. Moore et al. (2025) illustrated through the clustering of bikeshare stations around walkable, mixed-use corridors, and Fatima et al. (2022) a related conclusion was reached regarding transit accessibility among older commuters. Realizing this pattern in practice requires coordination across transport, spatial planning, public health, and green-space agencies, along with ongoing monitoring of route use, mode choice, user satisfaction, accessibility, and shared-mobility demand, so that observed outcomes can continue to inform design and maintenance decisions.

Limitations and Further Research

This review has several limitations that should be considered when interpreting its findings. The evidence base is geographically concentrated in Europe and Asia, with limited representation from North America and Oceania and none from Africa or Latin America, which constrains the transferability of the synthesized mechanisms to lower-income and rapidly urbanizing contexts with different climates, informal transport sectors, and weaker street-management systems. The quality-appraisal process relied on a single assessor applying the rubric in two passes, which, despite the conservative-scoring rule used to resolve disagreements, cannot fully substitute for independent dual-reviewer coding.

Most included studies were cross-sectional, so the causal ordering proposed in the thematic synthesis, from planning through environmental exposure, route experience, and satisfaction to eventual mode choice and motorized travel, remains an interpretive framework rather than a directly tested causal pathway. The classification of studies into direct green, built-environment, and shared-mobility groups also involved some judgment calls for studies spanning more than one exposure type, which may have shifted a small number of studies between categories. Future research would benefit from longitudinal and natural-experiment designs capable of isolating the effect of green-infrastructure investment from co-occurring built-environment changes, greater representation from underrepresented world regions, and more consistent reporting of route-level rather than proximity-only exposure measures to enable more precise cross-study comparison.

CONFLICT OF INTEREST

The authors declare that they have no financial or non-financial conflicts of interest relevant to this work.

AUTHOR CONTRIBUTION

SS.Conceptualization, methodology, literature search, screening, data curation, formal analysis, visualization, writing-original draft, and project administration. **RR**. Conceptualization, methodology, validation, supervision, and writing-review and editing. Debby Endriani and Sheila Hani: Screening, data extraction, data verification, formal analysis, and writing-review and editing. **ANM.** Validation, interpretation of findings, visualization, and writing-review and editing. **MC**. Conceptualization, methodological validation, supervision, and writing-review and editing. All authors read and approved the final manuscript and agree to be accountable for the integrity of the work.

CONCLUSION

This review synthesized evidence from 27 primary studies published between 2021 and 2025 to examine how green infrastructure, built-environment characteristics, and shared-mobility systems relate to sustainable urban mobility outcomes. The evidence base leaned toward supportive associations overall, yet the strength of these associations was consistently conditional on route continuity, accessibility, safety, and connection to daily destinations rather than on the mere presence of green or well-designed infrastructure. Direct green-space exposure was most closely tied to walking, cycling, and travel satisfaction, while built-environment and accessibility factors, which formed the largest share of the sample, more often explained mode choice and trip generation through network connectivity and mixed land use. Shared-mobility and public-space integration studies, though the smallest group, offered some of the most consistent evidence that infrastructure design and intermodal connections facilitate a shift toward active and shared travel. Across all three groups, motorized travel distance remained the outcome least directly influenced by environmental exposure, reinforcing the review's central finding that green infrastructure functions as one component within a broader, interconnected mobility system rather than as an independent driver of travel behavior.

These findings carry practical implications for how green infrastructure is planned, appraised, and integrated into urban mobility systems. Rather than treating green space as a standalone amenity, planning practice would benefit from embedding it within pedestrian and cycling networks, transit access points, and compact mixed land use, since the reviewed evidence consistently showed that isolated green assets delivered limited mobility value on their own. At the same time, the geographic concentration of the evidence in Europe and Asia, together with the predominantly cross-sectional nature of the included designs, means that the mechanisms identified here should be treated as a starting framework rather than a universally validated model. Future research extending into underrepresented regions and adopting longitudinal or natural-experiment designs would help clarify whether the conditional pathways described in this review hold consistently across different urban, economic, and institutional contexts.

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