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From Spatial Configuration to Visitor Experience: Linking Space Syntax, Physical Activity Intensity, Satisfaction, and Place Attachment in Urban Parks

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ABSTRACT

This study examines how spatial configuration in urban parks influences visitor experiences, with particular attention to tourism-related implications. As urban parks increasingly serve as both leisure infrastructure and tourism destinations, evidence linking spatial design to movement behavior, physical activity, satisfaction, and place attachment remains fragmented. A structured scoping review of studies published between 2016 and 2025 was conducted following PRISMA-ScR guidelines, using searches across Scopus, Web of Science, PubMed, ScienceDirect, and Google Scholar. Studies related to space syntax, urban parks, visitor movement, physical activity, satisfaction, and attachment were screened and synthesized through thematic analysis and evidence mapping. Findings indicate that configurational accessibility (e.g., integration, choice, depth) and legibility (e.g., intelligibility and visibility) consistently influence visitor movement patterns, route selection, and time spent within parks. Emerging evidence suggests that well-connected path networks, looped trails, and distributed access points may support higher walking levels and moderate-to-vigorous physical activity (MVPA), particularly when complemented by safety and amenities. Satisfaction was shaped by accessibility, environmental quality, facilities, and crowding, while place attachment developed through repeated and meaningful experiences. However, integrated models linking spatial configuration, activity intensity, satisfaction, and attachment remain limited. This review contributes an integrated conceptual framework and practical guidance for designing tourism-oriented urban parks that promote physical activity, enhance visitor experiences, and foster stronger place attachment and stewardship.

1. INTRODUCTION

Urban parks have become central arenas where everyday urban life intersects with leisure, health promotion, and urban tourism. They are increasingly promoted as "green attractions" that host cultural events, festivals, nature-based recreation, and iconic landscapes that circulate in destination marketing and social media. At the same time, parks remain essential public health and equity infrastructures that provide accessible opportunities for physical activity, stress recovery, social interaction, and contact with biodiversity and environmental aesthetics [1-5]. These multiple roles place urban parks at the heart of contemporary debates on how cities can deliver both healthy everyday environments and memorable visitor experiences without undermining ecological integrity or social inclusion [1, 3, 6, 7].

Within tourism and recreation studies, satisfaction and place attachment are widely treated as pivotal outcomes that shape loyalty, revisit intention, word-of-mouth, and stewardship behaviours. In urban park contexts, satisfaction has been linked to perceived environmental quality, amenities, cleanliness, safety, and the match between settings and visitors' motives [8-11]. Place attachment—often conceptualised through place identity and place dependence—captures how repeated experiences become emotionally and functionally embedded in a setting, influencing both behavioural loyalty and support for management actions [12-14]. Recent evidence also highlights that place attachment is not merely a retrospective sentiment: it can amplify perceived benefits of nature exposure, strengthen social connection, and contribute to wellbeing pathways that matter for both residents and tourists [14-16].

Parallel to these experience-oriented traditions, urban planning and spatial analytics have advanced powerful methods for linking spatial structure to human movement. Among these, space syntax has become one of the most widely applied configurational approaches to explain how the topology and geometry of networks shape route choice, co-presence, and the distribution of pedestrian flows [17]. Space syntax metrics—such as integration (a proxy for "to-movement"), choice (a proxy for "through-movement"), depth, connectivity, and intelligibility—have been extended beyond street networks to a variety of public spaces, including parks and green-blue corridors, to assess accessibility and legibility [18-21]. In recent work, configurational analysis is increasingly combined with geographic information system

(GIS)-based accessibility, global positioning system (GPS) tracking, and advanced network tools (e.g., OSMnx workflows) to better represent how visitors traverse complex park systems [22-25].

A key reason why spatial configuration matters for tourist experience is that it conditions what visitors can do and what they can easily encounter. The arrangement of entrances, paths, intersections, and activity nodes shapes the "activity opportunity structure" of the park: where walking is convenient, where running loops form naturally, which viewpoints are encountered without deliberate search, and where crowding accumulates. Emerging empirical studies show that configurational accessibility is related not only to overall park use, but also to the spatial distribution of social interactions and co-presence that underpin perceived vibrancy and safety [21, 26, 27]. At a broader scale, configurational metrics are also being used to evaluate equity of access to parks and green spaces, an issue of increasing relevance where tourism-led investment risks reinforcing spatial inequalities [7, 20, 28].

In public health and environmental behaviour research, the intensity of physical activity is not a minor detail but a core determinant of potential health benefits. Moderate-to-vigorous physical activity (MVPA) has been consistently associated with cardiovascular and metabolic health outcomes, and international guidelines emphasise the need to create environments that support regular MVPA across the life course [29-31]. In parks, intensity is shaped by both individual characteristics and environmental affordances: pathways can encourage continuous walking, while facilities, gradients, and micro-design features can support vigorous activities such as running or sports. Recent studies increasingly combine GPS and accelerometry or systematic observation tools to link specific park zones and facilities with instantaneous intensity [23, 24, 30, 32]. These methods create an opening for connecting spatial configuration (how the park "invites" movement) with embodied experiences (how the body actually moves in the park).

Despite advances in each domain, the literature remains compartmentalised. Space syntax studies of parks often stop at predicting movement density or accessibility and rarely connect configurational features to health-relevant intensity outcomes or to tourism constructs such as satisfaction and attachment [18, 20, 26]. Physical activity studies frequently focus on facility provision or perceived park quality and only sometimes include rigorous metrics of network configuration or legibility [24, 32, 33]. Tourism and environmental psychology studies of satisfaction and place attachment, meanwhile, may treat the physical setting as a bundle of attributes without analysing how spatial configuration structures the sequence of encounters and effortful movement through which experiences unfold [12, 14, 15, 34]. As a result, we still lack a coherent account of how spatial configuration translates into tourist experience via behavioural pathways such as physical activity intensity.

In this article, visitor is used as an inclusive category covering local residents, domestic tourists, international tourists and other park users when residence status is not reported. The term tourist is retained only when a cited study or implication concerns destination use, first-time visitation, loyalty, willingness to pay, or urban parks embedded in wider tourism systems. This distinction is necessary because the reviewed empirical base remains dominated by residents and mixed visitor samples, whereas tourism-specific evidence in urban park configuration research is still developing.

This review addresses that gap by asking: How has space syntax been used to characterise urban park configuration and visitor movement? What evidence links configurational metrics to physical activity intensity within parks? How do movement and activity experiences relate to satisfaction and place attachment among park visitors, including tourists? And what methodological strategies enable integration across these levels? By synthesising work published between 2016 and 2025, the review provides (1) an evidence map of study designs, measures, and contexts; (2) a thematic synthesis that links configuration, activity intensity, satisfaction, and attachment; and (3) an integrative conceptual model and research agenda to guide future interdisciplinary work at the interface of urban planning, public health, and tourism studies.

The remainder of the manuscript is organised as follows. Section 2 details the review methodology, including database searches, screening, and thematic synthesis procedures. Section 3 reports the findings, structured around key themes and common challenges. Section 4 discusses implications for park design and management, identifies research gaps, and proposes directions for future studies. Section 5 concludes with a summary of contributions and recommended priorities for advancing evidence-based, experience-oriented urban park planning.

2. METHOD

2.1 Research design

This manuscript reports a structured scoping review that maps and synthesises recent empirical and methodological research connecting (1) spatial configuration in urban parks (with an emphasis on space syntax and related configurational analysis), (2) visitor movement and physical activity intensity, and (3) experiential outcomes including satisfaction and place attachment. A scoping review design was selected because the target literature is interdisciplinary, spans heterogeneous study designs (field observations, wearable sensing, GIS/space syntax modelling, and survey-based experience research), and uses inconsistent terminology for both spatial configuration and tourist experience constructs. The review was designed and reported primarily according to the PRISMA extension for scoping reviews, with selected PRISMA 2020 items used as supplementary checks for documenting the search strategy, selection process and flow diagram [35, 36]. Evidence charting and thematic interpretation were further informed by established review practices in park-based physical activity and environmental research [31, 32, 37]. Table 1 below shows the searching method.

2.2 Search strategy

Searches were conducted for publications between January 1, 2016 and December 31, 2025. Five databases were selected to capture the interdisciplinary scope: Scopus and Web of Science (broad coverage of planning, design, and tourism journals), PubMed (health and physical activity research), ScienceDirect (environment–behaviour and park design outlets), and Google Scholar (to identify additional relevant articles and early online versions). Search strings combined three keyword blocks: (A) spatial configuration (e.g., "space syntax", "integration", "choice", "axial", "segment analysis",

"visibility graph", "legibility"), (B) setting (e.g., "urban park", "green space", "urban forest park", "greenway", "public open space"), and (C) outcomes (e.g., "visitor movement", "GPS tracking", "physical activity intensity", "MET", "MVPA", "SOPARC", "satisfaction", "tourist experience", "place attachment", "revisit intention"). Database-specific syntax and filters were applied where available.

After deduplication and screening, the final corpus emphasised studies that explicitly operationalised spatial configuration and provided empirical or model-based links to movement, physical activity intensity, or experience outcomes.

Eligibility criteria were defined prior to screening to focus the review on studies with a clear connection to urban park spatial configuration and visitor experience. Table 2 details the inclusion and exclusion criteria.

Table 1. Search strategy and keywords

Database	Keywords / Search String	Time Frame	No. of Results Retrieved	No. of Studies Selected
Scopus	"space syntax" AND ("urban park" OR "green space" OR "urban forest park") AND (movement OR walk* OR "physical activity" OR satisfaction OR "place attachment")	2016-2025	412	26
Web of Science	TS = ("space syntax" AND ("urban park" OR "green space") AND (walk* OR movement OR "visitor experience" OR satisfaction OR "place attachment"))	2016-2025	287	18
PubMed	(park OR "green space") AND ("physical activity" OR MVPA OR MET) AND (GPS OR accelerometer OR SOPARC) AND (satisfaction OR wellbeing)	2016-2025	356	12
ScienceDirect	TITLE-ABSTR-KEY("space syntax" AND park AND (movement OR accessibility OR satisfaction OR attachment))	2016-2025	198	11
Google Scholar	"space syntax" "urban park" accessibility movement MVPA satisfaction place attachment	2016-2025	920	23

Note: MET = Metabolic Equivalent of Task, SOPARC = System for Observing Play and Recreation in Communities

Table 2. Inclusion and exclusion criteria

Criteria Type	Inclusion Criteria	Exclusion Criteria
Time Frame	Studies published between 2016 and 2025 (inclusive).	Studies published before 2016.
Publication Type	Peer-reviewed journal articles, full conference papers, and systematic/scoping reviews.	Editorials, commentaries, theses, non-peer-reviewed reports (unless methodological guidance).
Setting	Urban parks, urban green spaces, urban forest parks, greenways used as visitor destinations.	Rural/national parks without an urban context; purely indoor facilities.
Spatial Component	Space syntax (axial/segment/VGA) or explicit configurational/network analysis of paths/streets within or connecting to parks.	Area-only greenspace indicators (e.g., % greenness) with no network/configuration analysis.
Outcome Component	Movement patterns, park use, physical activity intensity (e.g., MET/MVPA), satisfaction/experience quality, place attachment (identity/dependence), loyalty or revisit intention.	Studies reporting only ecological indicators or purely visual/landscape assessments without visitor outcomes.
Language	English.	Non-English where translation was not available.

Note: VGA = Visibility Graph Analysis

2.3 Inclusion and exclusion criteria

The studies published between 2016 and 2025 were included to capture recent developments in urban park research. Publications comprised peer-reviewed journal articles, full conference papers, and systematic or scoping reviews, while editorials, commentaries, theses, and non-peer-reviewed reports were excluded unless they provided methodological guidance. The review focused on urban parks, urban green spaces, urban forest parks, and greenways functioning as visitor destinations. Studies were required to incorporate spatial configuration analyses using space syntax approaches (axial, segment, or Visibility Graph Analysis [VGA]) or related network-based methods. Included studies also had to examine visitor-related outcomes such as movement patterns, park use, physical activity intensity, satisfaction, experience quality, or place attachment. Studies focusing solely on ecological indicators or landscape aesthetics without visitor-related outcomes were excluded. Only English-language studies were included as shown in Table 2.

2.4 Screening process

All records were exported to a reference manager and deduplicated before screening. Screening proceeded in two stages: title and abstract screening against eligibility criteria, followed by full-text screening for final inclusion. Eligibility decisions were checked through a consensus process in which uncertain cases were discussed against the predefined inclusion and exclusion criteria. Because the screening was organised as a consensus-based scoping review workflow rather than a fully independent duplicate coding exercise with retained paired decisions for each record, Cohen's kappa was not computed. To reduce selection inconsistency, the same eligibility criteria were applied across both stages, and studies were included conservatively when they plausibly contributed evidence to at least one linkage in the configuration, activity

and experience chain.

2.5 Data extraction and analysis

For each included study, data were extracted into a structured charting form covering: publication year; country/region; park type and scale; target population (residents, tourists, mixed visitors, specific age groups); spatial measures (space syntax metrics, GIS accessibility, visibility analysis); behavioural measures (counts, GPS tracks, SOPARC observations, accelerometer-derived intensity such as MET or MVPA); experience measures (satisfaction, perceived quality, restoration, place attachment dimensions); and analytical approaches (regression, multilevel modelling, structural equation modelling, machine learning, agent-based simulation). During charting, visitor category was coded as tourist, resident, mixed visitor, or not specified when the original study provided sufficient information. Studies that did not report residence status, travel purpose, or familiarity were interpreted as mixed-visitor evidence and were not used to support tourist-only claims. To characterise methodological quality across mixed designs, we noted whether studies reported sampling frames, device data processing protocols, confounder control, and scale alignment, drawing on principles commonly used in mixed-method appraisal [31, 32, 37]. Synthesis proceeded through (1) descriptive evidence mapping, (2) thematic analysis to identify recurrent linkages and mechanisms, and (3) development of an integrative framework connecting configuration to experience via physical activity intensity and satisfaction.

3. FINDINGS

3.1 Overview of selected studies

The final corpus comprised 81 studies published between 2016 and 2025. Publication volume increased after 2019, reflecting a broader shift toward data-rich methods (e.g., GPS traces, mobile sensing, street-view analytics) and renewed policy attention to urban parks as public health assets and resilient tourism infrastructures [1-4]. Geographically, studies were concentrated in East and Southeast Asia (especially China, Hong Kong, and South Korea), Western Europe, and North America, with emerging contributions from the Middle East and Latin America. Several factors likely drive this distribution: rapid urban densification and park planning initiatives in Asian megacities, established space syntax research communities in Europe, and strong public health-built environment traditions in North America [17, 20, 22]. Methodologically, four dominant clusters were identified: (1) configurational modelling of accessibility and movement (space syntax axial/segment analysis, visibility graph analysis), (2) observational or sensor-based measurement of park-based physical activity intensity (SOPARC, accelerometer/GPS integration), (3) survey-based evaluation of satisfaction, restorative experience, and place attachment, and (4) integrated multi-method designs combining at least two of the above.

Only a subset of studies explicitly treated urban parks as tourism destinations or distinguished tourists from residents. For this reason, the synthesis uses visitor as the broader empirical category, while discussing tourist experience only where the evidence concerns first-time visitors, destination parks, loyalty, willingness to pay, or urban parks embedded in wider tourism systems. Many papers nevertheless remain tourism relevant because they examine visitor motivations, park branding, willingness to pay, satisfaction, revisit intention and behavioural loyalty [10-13]. Across contexts, studies converge on the idea that spatial configuration shapes the sequence and effort of park experiences, while satisfaction and attachment are shaped by both the physical setting and the social conditions that configuration helps to produce, including co-presence, crowding and perceived safety [14, 15, 26].

Overall, Table 3 illustrates that rigorous links between configuration and movement are common, and links between park zones/facilities and activity intensity are increasingly evidence-based, but only a small number of studies measure configuration, intensity, and experience outcomes in the same design.

Table 3. Summary of key studies linking configuration, activity, satisfaction, and attachment in urban parks (2016-2025)

Author(s)	Study Location	Objective	Methodology	Key Findings	Limitations
[3]	International	Assess COVID-19 impacts on green space use and perceptions.	Multi-country survey.	Use patterns shifted; perceived value of nearby parks increased; crowding concerns grew.	Self-report; pandemic context specific.
[4]	Review	Link green space quality to PA and health.	Review of empirical studies.	Quality (not just quantity) associates with activity and health; safety and maintenance matter.	Mixed measures; limited park-specific intensity data.
[6]	USA (multiple)	Relate park quality to use and wellbeing outcomes.	Field audits + surveys; regression.	Perceived quality and amenities influence use and psychological benefits.	Quality measures vary; configuration often implicit.
[6]	Review	Summarize equity and justice issues in urban green space.	Narrative/systematic synthesis.	Equity must consider access, quality, and displacement risks; tourism investment can exacerbate inequity.	Conceptual; limited park-specific configuration metrics.
[8]	Padua, Italy	Compare general vs stress-relief preferences for green spaces.	Survey + scenario evaluation.	Safety and maintenance consistently shape preference; stress-relief context changes attribute weights.	Preference study; no intensity measurement.
[10]	Kolkata, India	Assess perceived benefits, aesthetics, willingness to pay for parks.	On-site surveys; preference modelling.	Aesthetics and perceived benefits increase visitation value and satisfaction-related outcomes.	Economic valuation focus; limited configuration metrics.

Author(s)	Study Location	Objective	Methodology	Key Findings	Limitations
[12]	Urban park (USA)	Test place attachment–loyalty relationship.	Visitor surveys; SEM.	Place attachment predicts behavioural loyalty and revisit intention.	Limited spatial measures; cross-sectional.
[14]	Los Angeles, USA	Measure visitors' attachment to urban parks.	Survey + behavioural indicators.	Attachment varies by use frequency and perceived park benefits; ties to stewardship intentions.	Self-selection; limited configurational analysis.
[15]	Vienna, Austria	Predict place attachment among urban walkers.	Survey; modelling motivations, satisfaction, setting development.	Satisfaction and past experience predict attachment; development level and motivations matter.	Not park-specific paths; limited objective movement data.
[20]	Changsha, China	Evaluate park accessibility using space syntax.	Space syntax + spatial statistics; multi-radius analysis.	Configurational accessibility varies by radius; perceptual accessibility linked to road structure synergy.	Accessibility focus; no experience outcomes.
[21]	Method framework	Propose accessibility–visibility–intelligibility evaluation for green-blue spaces.	Conceptual + operational framework.	Highlights legibility as complement to distance accessibility; supports user-centred planning.	Framework; limited empirical validation.
[24]	Shanghai, China	Link park facility use to seniors' activity intensity.	GPS + accelerometer; multilevel models.	Pathway use associated with higher MET/MVPA; lawns/open spaces linked to lower intensity.	Two parks; cross-sectional; older adults only.
[26]	China (urban parks)	Assess how configuration shapes social interactions.	Space syntax + field observation; regression.	Higher integration/choice associated with more social interactions; nodes matter.	Context-specific; interaction measures vary.
[30]	Review	Synthesize SOPARC-based evidence on park use and PA.	Systematic review.	Park features and programming relate to PA levels; SOPARC enables zone-level intensity patterns.	Heterogeneity; limited causal inference.
[32]	Review	Synthesize associations between physical environmental attributes and park-based physical activity.	Systematic review	Paths or trails, lighting and incivilities emerged as key physical environmental attributes associated with park-based physical activity.	Heterogeneous measures; limited causal inference; no direct space syntax or place attachment outcomes.
[33]	China & Germany	Compare elderly use of physical activity areas in parks.	Systematic observation + interviews.	Designated PA areas facilitate activity but cultural patterns differ; facility fit matters.	Limited to selected parks; mostly descriptive.
[38]	Hong Kong, China	Examine associations between park environmental characteristics and adolescents' park-based MVPA in a high-density city.	SOPARC + park audit; mixed-effects models; multilevel modelling.	Amenities quality was positively associated with adolescents' park-based MVPA; safety and aesthetics relationships varied by neighborhood income.	Cross-sectional design; observational intensity measures; no space syntax metrics.
[39]	Belgium	Identify park characteristics preferred for youth activity.	Latent class analysis of preference data from adolescents aged 12-16 years.	Park upkeep was most important for at-risk adolescent subgroups, followed by playground or outdoor fitness equipment; sport fields were more important for more active boys visiting parks with friends.	Preference-based design; no observed behaviour; adolescents only; no configurational metrics.
[40]	Xi'an, China	Integrate GIS and space syntax for multi-scale park accessibility.	Multi-scale network + syntax indicators.	Urban park accessibility varied across spatial scales; combining GIS and space syntax provided a more nuanced assessment than using accessibility indicators alone.	Primarily spatial; limited behavioural data.

Note: SEM = Structural Equation Modeling

3.2 Thematic findings

3.2.1 Space syntax in urban park research: from access to legibility

The first theme concerns how researchers conceptualise and operationalise "spatial configuration" in urban parks. Across the corpus, space syntax is used in two main ways. One focuses on configurational accessibility: parks are evaluated as destinations within broader street networks, often using segment-based integration, choice, and angular metrics at multiple radii to represent how easily different neighbourhoods can reach park entrances [7, 20, 22]. The other focuses on internal configuration: the park's own path network is modelled to identify integrated spines, segregated pockets, and the likely distribution of movement within the park itself [21, 26]. Both approaches align with a broader planning shift toward network-based accessibility analysis that recognises that "distance to a park" is not purely Euclidean but

mediated by path structure, barriers, and route attractiveness.

A recurring methodological advance is the move from purely topological accessibility to user-centred legibility and intelligibility. Studies increasingly recognise that visitor experience depends not only on objective access but also on whether routes are cognitively navigable and whether destinations are visually and semantically discoverable [21]. For tourists and first-time visitors, legibility may be especially influential because they lack routine familiarity and may be more sensitive to wayfinding friction, uncertainty, and perceived risk. Configurational indicators such as intelligibility (correlation between local connectivity and global integration) are therefore framed as not just movement predictors but experience predictors: they potentially shape feelings of control, exploration enjoyment, and perceived safety, which are common antecedents of satisfaction in tourism settings.

Several studies emphasise scale effects: configurational accessibility at a 500-800 m radius may capture walk-in catchments and everyday use, while larger radii (2-5 km or beyond) may better represent cycling, transit connections, or tourist itineraries that integrate parks with other attractions [20, 22]. This multi-scale reasoning is important because the same park can be simultaneously a neighbourhood open space and a city-level tourism node. Evidence suggests that different design interventions target different scales: entrance placement and external street connectivity matter for citywide access, while internal path continuity and node distribution matter for on-site experience.

A methodological gap remains in how internal and external configurations are jointly analysed. While some studies compute accessibility to park entrances from the street network and then separately analyse internal circulation, few explicitly model the coupling between the two networks—for example, how a highly integrated street segment aligns (or fails to align) with an intuitive internal park spine, potentially creating bottlenecks, uneven distribution of use, or wayfinding confusion. Emerging network toolchains, including open-source workflows for graph construction and analysis, are increasingly used to bridge these scales [22, 23], but their application to integrative experience research is still limited.

3.2.2 Spatial configuration and visitor movement patterns

The second theme concerns the evidence base linking configuration to movement patterns in urban parks. Across studies, configurationally integrated paths tend to concentrate pedestrian movement, functioning as “main spines” that channel both through-movement and exploratory strolling [17, 22, 26]. This pattern appears robust across settings because integrated segments reduce route complexity and connect multiple destinations with relatively low cognitive load. In tourism terms, these paths can act as default itineraries that structure the sequence of encounters with scenery, amenities, and social activity.

Empirical movement evidence is increasingly derived from GPS trajectories, mobile phone location datasets, and systematic observations. GPS-based studies enable fine-grained analysis of route choice, dwell times, and repeated circuits, offering a behavioural window into how visitors actually use networks rather than how planners assume they will [22-24]. When combined with space syntax, such data can be used to test whether integrated segments predict higher track density and whether choice metrics predict cross-park traversal. While the review found relatively few fully integrated designs, the available evidence supports the intuition that configuration is a first-order driver of movement distribution, with environmental quality and programming acting as secondary attractors.

Movement studies also highlight heterogeneity across visitor types and motives. For example, recreational walkers may prefer looped circuits that enable rhythmic movement and easy self-monitoring of distance, while tourists seeking iconic views may tolerate more complex routes if wayfinding support is available and the payoff is high [10, 15]. Families and older adults may select routes with rest points and minimal conflict with faster users, which implies that configuration should not only be integrated but also diversified: multiple parallel routes may be needed to reduce conflict and support inclusive experiences [24, 33].

Recent work on social interaction adds another layer: configuration shapes co-presence, which can be positive (vibrancy, social connection) or negative (crowding, conflict). Sheng et al. [26] found that more integrated spaces were associated with more social interactions in urban parks, suggesting that configuration can indirectly influence experience quality through social density. In tourism contexts, this implies that managers may need to deliberately balance “lively” integrated areas with quieter, restorative zones by adjusting path structure, landscape buffers, and access points, rather than relying solely on programming or signage.

3.2.3 Spatial configuration and physical activity intensity

The third theme addresses the emerging literature connecting configuration to physical activity intensity. Compared with movement-volume studies, intensity studies are fewer, but they provide crucial insight because health and wellbeing benefits depend on intensity, duration, and regularity. A consistent message is that pathways and connected trail systems are among the most reliable correlates of both park use and higher intensity activity, especially walking-based MVPA [24, 30, 33]. Configurationally, pathways often coincide with high integration/choice lines, suggesting a plausible mechanism: integrated networks support continuous locomotion by minimising dead-ends, facilitating loops, and providing multiple route options that maintain interest and reduce perceived effort.

The strongest direct evidence comes from studies that combine accelerometers and GPS to assign intensity to specific park facilities or zones. Zhai et al. [24], for instance, reported that seniors spent a substantial share of park-visit time in MVPA and that pathway use was positively related to MET and MVPA, while lawns and open paved areas were less likely to be associated with higher intensity. Although this study did not explicitly compute space syntax metrics for internal routes, its results align with configurational reasoning: continuous, well-connected path networks provide the structural precondition for sustained walking. Similar conclusions appear in youth studies where amenities and supportive facilities predict observed MVPA, indicating that activity-friendly environments depend on both network structure and facility programming [30, 32].

A second strand of evidence concerns how park environment quality moderates intensity. High-quality supporting amenities (e.g., benches, toilets, lighting) and perceived safety can enable longer and more intense activity by reducing stressors and increasing comfort, especially for vulnerable groups such as adolescents in low-income neighbourhoods or older adults [32, 33]. From a

configurational perspective, these moderators are not independent of configuration: amenities and safety features are typically distributed along main routes and nodes, which can create a reinforcing loop where integrated paths become both easier and more rewarding to use, further concentrating activity.

Few studies directly test whether specific space syntax metrics predict intensity, but the reviewed evidence supports several hypotheses that future research can test more rigorously. First, higher integration and intelligibility are likely to support higher intensity for tourists and first-time visitors by reducing wayfinding friction and enabling confident continuous movement [21]. Second, higher choice may support longer walking distances by facilitating cross-park traversal and linking multiple attractions, potentially increasing total energy expenditure. Third, a network with multiple loops and alternative routes may support both intensity (for runners) and comfort (for strollers) by reducing congestion and enabling self-selected pace. These hypotheses align with broader evidence that network structure and street layout influence walking behaviour in cities, including health-relevant walking outcomes [2, 17].

Methodologically, intensity research depends on clear data processing protocols for wearable devices and consistent definitions of intensity thresholds [30, 31]. In the park literature, variability in epoch length, cut-points, and non-wear algorithms makes it difficult to directly compare intensity distributions across studies. This review therefore treats intensity findings as pattern evidence rather than as directly comparable effect sizes.

3.2.4 Satisfaction, experience quality, and the role of movement

The fourth theme synthesises research on satisfaction and experience quality in urban parks, with attention to how movement and configuration may underpin these outcomes. Satisfaction in park settings is generally multi-dimensional, reflecting both functional evaluations (access, amenities, cleanliness) and affective responses (enjoyment, relaxation, perceived restoration). Empirical studies repeatedly identify aesthetics, maintenance, and perceived safety as strong predictors of satisfaction and preference [8, 9, 33]. In high-density cities, satisfaction is also sensitive to crowding and the availability of comfortable micro-spaces for pause, viewing, and socialising, which are partly produced by spatial layout.

Movement is relevant to satisfaction through at least three pathways. First, movement determines exposure: the routes visitors take shape what they see, how quickly they reach desired settings, and how often they encounter stressors such as congestion or conflicts between user groups. Second, movement is itself part of the experience: many visitors come to parks specifically for walking or jogging, and the ease of maintaining a desired pace influences enjoyment and perceived benefits [15, 24]. Third, movement shapes social encounters: integrated routes and nodes can facilitate social interaction and perceived vibrancy, which may increase satisfaction for some visitors while reducing it for others seeking tranquillity [3, 26].

Several studies provide indirect evidence that satisfaction is linked to the quality of movement environments. For example, in adolescents' park-based MVPA, amenities quality was associated with higher intensity activity [32], which suggests that better movement support can simultaneously enable activity and improve experience. In place attachment studies among walkers, satisfaction emerged as a key predictor of attachment [15]. Together, these findings support a plausible mediated chain in which configuration and design support desirable movement (including intensity) that contributes to satisfaction, which in turn supports attachment and loyalty.

However, the review also found evidence of trade-offs. Highly integrated spaces may attract high volumes of use, increasing congestion and reducing satisfaction for visitors motivated by stress relief or nature immersion [3, 8]. This indicates that park planning cannot equate "more integration" with "better experience" without considering crowding management and the need for diverse experiential zones. A key implication is that configuration should be designed not only to maximise access but also to distribute use in ways that preserve restorative experiences and avoid over-concentration.

3.2.5 Place attachment as an outcome of repeated, satisfying activity experiences

The fifth theme focuses on place attachment and how it emerges in urban parks. Across studies, attachment is consistently associated with frequency of use, past experience, and satisfaction. Bazrafshan et al. [15] found that satisfaction and past experience were strong predictors of attachment among urban walkers, suggesting that attachment is built through repeated confirmation that a place supports desired activities and provides positive outcomes. In an urban park setting, Plunkett et al. [12] reported that attachment predicted behavioural loyalty, highlighting attachment's relevance for tourism management and destination sustainability. Liu et al. [14] similarly documented attachment variation across parks and linked it to perceived benefits and stewardship tendencies.

From the perspective of spatial configuration, attachment can be interpreted as partially "produced" by a park's capacity to support stable, meaningful routines. A park with a legible network, coherent loops, and accessible nodes may more readily become a repeated walking/jogging setting, enabling visitors to develop personal meanings and identity-related ties. Conversely, a poorly connected or confusing network may raise the "activation energy" required to form routines, potentially weakening the likelihood of attachment among first-time visitors. Although this mechanism is not frequently tested directly, it is compatible with findings that satisfaction and perceived benefits mediate the relationship between place characteristics and attachment [14, 15].

The reviewed studies also suggest that attachment is multi-pathway. For some visitors, attachment is primarily functional (dependence) and linked to facility fit, accessibility, and convenience; for others it is affective/identity-driven and linked to symbolism, memory, and social connection. Tourism-oriented park studies that assess perceived benefits, aesthetics, and willingness to pay indicate that parks can become valued not only for exercise but also for cultural and emotional experiences [10, 11]. Configurational analysis may help explain why certain symbolic or scenic nodes become central to identity: nodes on highly traversed routes are more likely to be encountered, photographed, and incorporated into personal narratives, especially for tourists with limited time.

A practical implication is that attachment may be fostered not only through marketing or programming but also through configuration-sensitive design that supports repeatable positive experiences. In this sense, space syntax is relevant to "place-making" outcomes because it informs how spatial structure shapes everyday encounters and embodied practices that gradually build emotional bonds.

3.2.6 Toward integrated models: Linking configuration → intensity → satisfaction → attachment

The final theme concerns the limited but growing set of studies that attempt to integrate spatial analytics with behavioural and experiential outcomes. Multi-method designs combining configurational modelling, wearable sensing, and surveys remain uncommon, but they are methodologically important because they can test mediated pathways and reduce reliance on self-report. Zhai et al. [24] demonstrated how GPS and accelerometer integration can assign intensity to specific park settings, while Bazrafshan et al. [15] demonstrated how satisfaction and experience history predict attachment. Bridging these strands requires study designs that also quantify configuration and legibility of the movement environment.

Conceptually, an integrative model can be framed as follows. Spatial configuration shapes (a) movement opportunities (connectivity, loops, route alternatives), (b) cognitive effort (legibility, intelligibility), and (c) exposure to environmental and social stimuli (views, amenities, crowding). These factors influence physical activity intensity (pace, continuity, MVPA share) and perceived benefits (health, restoration), which contribute to satisfaction. Satisfaction then supports place attachment through repeated confirmation and meaning-making, which in turn predicts loyalty and stewardship outcomes [12, 14, 15]. This chain also includes feedback loops: attached visitors may increase frequency of use, further reinforcing intensity and satisfaction.

Analytically, integrated modelling can leverage multilevel structures (moments nested within routes nested within individuals nested within parks) and combine network measures with time-stamped activity signals. Methodological toolkits from urban analytics and health geography provide foundations for such integration, including open-source network construction and the coupling of spatial and temporal data streams [22, 23]. However, the review identified few studies that implement this full integration in urban parks, indicating a clear research opportunity.

3.2.7 Tourism dynamics, crowding, and smart wayfinding in urban parks

Although relatively few studies in the corpus explicitly adopt a tourism framing, many findings become more consequential when parks are treated as destinations within urban tourism systems. Tourism often concentrates visitation temporally (weekends, event days, holiday seasons) and spatially (iconic viewpoints, waterfront edges, heritage features). Under these conditions, configurational "hot spots" can become experience bottlenecks: integrated spines and landmark nodes accumulate queues, conflicts between fast and slow movers, and perceived crowding. The pandemic-era literature underscores how sensitive park experiences are to crowding and perceived risk; even when parks are valued more, visitors may avoid integrated areas if density undermines comfort [3]. From a management perspective, this suggests that spatial configuration analysis can inform not only design but also adaptive operations, such as dynamic routing, timed entry, or event layout planning that reduces pressure on a single corridor.

Table 4. Thematic synthesis and design/management implications

Theme	Description	Example Studies	Design/Management Implications
Configurational accessibility	External network structure shapes who can reach parks and how easily.	[7, 20, 22]	Improve multi-modal connections; locate entrances on integrated streets; address equity gaps.
Legibility and intelligibility	Wayfinding ease supports exploration and reduces cognitive effort, especially for tourists.	[17, 21]	Design clear path hierarchies, sightlines, and signage; align internal spines with external approach routes.
Movement concentration and co-presence	Integrated routes attract flows and social interaction, but can produce crowding.	[3, 26]	Distribute activity nodes; create parallel routes and quiet zones; manage events and peak-time crowding.
Activity intensity affordances	Connected pathways and facility fit shape MVPA and energy expenditure during visits.	[24, 30, 32]	Provide looped trails, smooth surfaces, rest points; align amenities with movement corridors; design age-friendly routes.
Satisfaction pathways	Satisfaction depends on accessibility, safety, maintenance, and the quality of movement experiences.	[8, 9, 33]	Maintain cleanliness and safety along key routes; use spatial design to reduce conflict and improve comfort.
Place attachment and loyalty	Attachment develops through repeated, satisfying activity and meaningful encounters.	[12, 14, 15]	Support repeatable routines (loops, landmarks); create identity nodes; engage visitors in stewardship programs.

Crowding effects are likely to interact with satisfaction and attachment in complex ways. For some tourists, lively and socially dense areas increase perceived atmosphere and destination "buzz"; for others, crowding reduces restorative benefits and discourages repeat visitation. Studies of place attachment and restorative experience emphasise psychological benefits including relaxation and comfort-security, benefits that can be compromised in overcrowded settings [14, 15, 41]. A practical challenge is therefore to maintain both vibrant and tranquil experiences within the same park by using configuration-sensitive zoning: leveraging integrated networks for access while creating alternative routes and buffered micro-spaces for quiet experiences [8, 26].

An emerging research frontier is the integration of "smart tourism" tools with configurational planning. Digital wayfinding apps, real-time crowd maps, and location-based interpretation can reduce cognitive load for tourists and redistribute flows away from congested segments. However, digital tools also risk reinforcing inequalities if they privilege digitally connected visitors and overlook the needs of older adults or visitors with disabilities. Equity-oriented reviews emphasise that inclusive green space planning must consider not only physical access but also informational and cultural access [1, 6, 7]. Future empirical work could test whether digital wayfinding interventions amplify or mitigate the relationship between configuration and satisfaction among

tourists.

Finally, urban parks are often embedded in broader attraction networks (waterfronts, museums, retail corridors), which means that "park experience" may extend beyond the park boundary. Configurational approaches are well-suited to modelling such extended itineraries, but the review found few studies that connect cross-destination route structure to within-park experiences. This is a critical opportunity: tourists' satisfaction with a park may be influenced by the comfort of approach routes, transfer points, and the sequencing of attractions in a day's itinerary. Integrating space syntax with tourism mobility data could therefore move research from isolated-park analysis toward destination-system analysis that better matches contemporary urban tourism realities [17, 22]. A summary of the thematic findings and corresponding design implications is presented in Table 4.

3.3 Common challenges identified

Across the reviewed studies, three methodological challenges repeatedly limited the strength of inferences about the configuration-experience chain. First, scale mismatch is common: configurational metrics may be computed at a city or neighbourhood scale (e.g., accessibility to park entrances), while experience outcomes are measured at the on-site or momentary level (e.g., satisfaction with a specific zone). Without explicit scale bridging, it is difficult to attribute experience differences to configuration rather than to local amenities or social conditions [20, 21].

Second, causal inference is limited by the prevalence of cross-sectional designs. Many studies measure satisfaction or attachment at one timepoint and infer developmental processes that likely unfold across repeated visits. Similarly, intensity studies often capture a small number of visits, which may not represent habitual patterns. While some studies use multi-level modelling to address clustering and confounding [24, 32], longitudinal and quasi-experimental designs remain scarce [1, 6].

Third, measurement heterogeneity complicates synthesis. Space syntax studies vary in the representation of networks (axial vs segment, angular vs topological), radius selection, and whether parks are modelled as permeable spaces or as bounded destinations. Physical activity studies vary in device processing and intensity thresholds [30, 31], while satisfaction and attachment scales vary in dimensional structure and cultural adaptation [12, 15, 42].

Beyond methodology, the literature faces practical and ethical challenges. High-resolution mobility data raise privacy concerns and require careful anonymisation, particularly when studying tourists whose location traces may be sensitive. In addition, tourism-related crowding can create conflicts between visitor experience and local residents' everyday use, making it essential to incorporate equity and justice into experience-oriented park planning [1, 6, 7].

4. DISCUSSION

This review set out to connect four bodies of scholarship that often evolve in parallel: (1) configurational analyses of spatial structure in and around urban parks, (2) behavioural evidence on park-based movement and physical activity intensity, (3) satisfaction and experience quality research, and (4) place attachment and loyalty frameworks. The synthesis suggests that the strongest empirical evidence currently exists for two links: configuration → movement distribution, and satisfaction → place attachment. The configuration → intensity link is emerging, supported most clearly by facility- and pathway-focused evidence, while the full mediated pathway configuration → intensity → satisfaction → attachment is still under-tested.

The framework incorporates several moderators that recur across studies. Visitor characteristics (age, mobility, cultural expectations, tourist vs resident status) influence both route selection and satisfaction thresholds [15, 33]. Environmental quality (maintenance, aesthetics, vegetation structure) and perceived safety can amplify or dampen the effect of configuration on both intensity and satisfaction [4, 8, 32]. Social density and crowding can convert high integration from a benefit (vibrancy) into a cost (stress), producing a non-linear relationship between accessibility and satisfaction [3, 26]. Finally, equity conditions (who has access, who benefits, who bears costs) shape whether tourism-oriented park investments support inclusive wellbeing or reinforce spatial inequalities [1, 6, 7].

Importantly, the framework reframes configuration as more than a movement predictor. In a tourism lens, configuration functions as part of the "experience infrastructure": it structures the rhythm of arrival, circulation, encounter, and pause. For example, an integrated internal spine that connects a sequence of scenic nodes can support an intuitively coherent narrative walk, while poorly connected fragments may lead to missed viewpoints, frustration, and reduced satisfaction among first-time visitors. This suggests that configurational design is directly relevant to experience design, not only to transport efficiency.

4.1 Practical implication

The reviewed evidence supports several practical implications for urban park planners and tourism managers who aim to enhance both physical activity benefits and visitor experience.

First, plan for multi-scale accessibility. External access is not only about proximity but also about network structure and the placement of entrances on integrated streets and transit-connected corridors [20, 28]. In tourism-heavy parks, multi-modal access planning can reduce congestion and distribute arrivals across multiple entrances, lowering peak crowding on internal spines.

Second, design internal networks as experience routes. Loop-based and well-connected path systems can support sustained walking and jogging, helping visitors achieve MVPA while also providing variety and choice [18, 24]. A practical design goal is to provide a hierarchy of routes: (a) highly legible main loops with frequent landmarks for first-time visitors and tourists, (b) secondary parallel routes for quieter experiences, and (c) short accessible circuits for users with mobility limitations. Legibility-oriented features—clear sightlines, consistent surfacing, and aligned signage—are likely to be especially valuable where visitors are unfamiliar with the park [21].

Third, distribute attractive nodes to balance flows and avoid over-concentration. Space syntax studies show that integrated spaces attract movement and social activity [26]. Managers can use this property strategically by locating rest points, viewpoints, interpretation, and services not only along the single most integrated spine but also at secondary nodes to

spread use. This approach can help maintain satisfaction by reducing perceived crowding and supporting diverse experience goals, including stress relief and contemplation [14, 43].

Fourth, align facility planning with intensity goals and user groups. Evidence indicates that pathways are key for MVPA, especially among older adults, while lawns and open paved areas may attract lower-intensity activities [24]. If the goal is to increase MVPA, parks should prioritise continuous, comfortable, and shaded routes with frequent seating, water, and toilets—an approach consistent with age-friendly planning [32]. If the goal is to support vigorous activity, planners can integrate longer uninterrupted segments, dedicated running loops, and conflict-reducing separation from slower walkers where possible.

Finally, incorporate equity and justice into experience-oriented interventions. Tourism investment can improve amenities and maintenance, potentially increasing satisfaction and attachment, but it can also intensify crowding or lead to displacement if improved parks contribute to gentrification dynamics [1, 6]. Spatial accessibility analyses that identify underserved neighbourhoods can support more equitable planning of entrances, connections, and park upgrades [7].

4.2 Research gaps and future directions

The synthesis identifies several research gaps and priorities for advancing integrated knowledge on configuration, physical activity intensity, satisfaction, and place attachment in urban parks.

Gap 1: Integrated measurement designs remain rare. Future studies should combine at least three data layers—configurational metrics, objective activity intensity (accelerometer and/or SOPARC), and experience outcomes (satisfaction and attachment scales)—within the same sample and time window. This would enable formal tests of mediated pathways and strengthen evidence beyond parallel inference from separate studies [12, 24].

Gap 2: Scale alignment and temporal dynamics require explicit modelling. Park experiences unfold over minutes and hours, while attachment develops over months and years. Longitudinal designs, repeated measures, and event-based sampling (e.g., before and after park redesigns) are needed to understand how changes in configuration or management interventions translate into changes in intensity, satisfaction, and attachment. Multi-scale configuration measures should be linked to the time geography of visits and routes rather than treated as static attributes [20, 28].

Gap 3: Tourist and resident pathways remain under-examined. Urban parks host heterogeneous publics, and the same configuration may have different implications for tourists, who may value exploration, scenic sequences and wayfinding clarity, and residents, who may value convenience, routines and nearby access. Future research should segment visitors by residence status, visit purpose, familiarity and length of stay, and should test whether legibility and intelligibility are stronger predictors of satisfaction for first-time visitors than for frequent users [11, 12, 21].

Gap 4: Equity, inclusion, and environmental justice need stronger integration with configurational experience models. Most accessibility studies stop at spatial distribution and do not connect inequity to lived experience outcomes such as satisfaction or attachment. Future work could integrate equity mapping with surveys and sensing to evaluate whether underserved groups experience lower intensity opportunities or lower satisfaction due to safety concerns, facility deficits, or network barriers [1, 6, 7].

Gap 5: New data sources offer opportunities but also raise ethical issues. Street-view imagery, social media, and mobile phone location data can provide large-scale proxies for perceived safety, aesthetics, and visitation patterns, but they may under-represent certain populations and require careful governance. Transparent privacy safeguards and participatory approaches are essential when studying tourists and other vulnerable groups [1, 6].

Methodologically, future research can also benefit from triangulation across modelling paradigms. For example, agent-based simulation could link configurational structure to emergent crowding dynamics under different tourism scenarios, while structural equation modelling can test how satisfaction mediates between activity experiences and attachment [12]. Network science and open-source graph analytics can support replicability and cross-city comparison when paired with consistent documentation of network construction choices [17, 20].

4.3 Operationalizing the framework: Measurement and modeling recommendations

To realise the framework proposed, studies should standardise spatial, temporal and respondent units. External and internal spatial configuration should be reported, such as network construction, radius, treatment of entrance, and whether park paths, lawns and plazas are permeable or not. Integration, choice, connectivity, intelligibility and visibility indicators should then be associated with outcome flow or activity at similar segment or zone units, rather than being viewed as a pure abstract spatial characteristic [20, 21, 28].

Flow or activity intensity should be associated with the same spatial units. GPS data can be map-matched to paths and averaged as mean metabolic equivalent (MET), minutes of MVPA, dwell time and pace per segment or zone. Accelerometer studies should detail device placement, epoch (time) and intensity cut-offs, and non-wear criteria; SOPARC studies should detail observed areas, times and training and agreement of observers. These must be reported because the lack of standardised device processing and observation procedures limit the comparison between studies [24, 30, 44].

Outcomes should be operationalised to test the proposed pathway. Visitors' overall satisfaction should be supported by satisfaction with route clarity, safety, landscape, crowd and amenities. Place attachment should separate place identity and place dependence; and residential status, purpose of visit and familiarity should be established so that pathways can be compared across visitors and residents [12, 14, 15].

In terms of analysis, the approach is best validated via multi-level and mediation equations, in which moments or route segments are nested within individuals and parks. Structural equation modelling can verify the relationship of satisfaction between activity experiences and attachment, and before and after parks redesigns or events can increase certainty. Transparency would be enhanced by describing the basis for constructing the network, code (where possible) and segment summaries (deidentified) as opposed to individual traces.

4.4 Implications for evidence-based park tourism and public health policy

Urban parks increasingly serve overlapping policy agendas: physical activity promotion, climate adaptation, biodiversity support, and tourism development. The reviewed literature suggests that these agendas can be mutually reinforcing when configuration-sensitive design supports both healthy movement and high-quality experiences, but they can also conflict when tourism-driven crowding undermines restorative benefits or when investments concentrate in already privileged areas. Evidence on inequity in park access and quality indicates that planners should evaluate interventions not only by aggregate visitation or satisfaction but also by distributional outcomes across neighbourhoods and social groups [1, 6].

For evaluation, the proposed framework encourages a shift from single-metric success (e.g., "increase visitation") to multi-criteria success: increase equitable access, increase MVPA opportunities, maintain or improve satisfaction across visitor segments, and foster place attachment and stewardship. Spatial configuration analysis can help anticipate where visitation will increase after upgrades and where crowding may concentrate. Activity intensity measures can indicate whether increased visitation translates into health-relevant movement or merely into sedentary presence. Satisfaction and attachment measures can capture whether visitors perceive the park as welcoming, safe, and meaningful—outcomes that matter for repeat visitation and long-term support.

Finally, inclusive governance and community participation remain essential complements to technical analysis. Equity-focused scholarship notes that green space planning decisions can reproduce exclusions through design cues, policing practices, or cultural mismatches even when objective access improves [1, 6, 45]. Therefore, configuration and sensing data should be interpreted alongside participatory feedback to avoid technocratic solutions that ignore lived experience. Integrating participatory mapping with configurational modelling could help identify "invisible barriers" (e.g., perceived safety deficits) that shape tourist and resident experiences differently.

4.5 Limitations of the review

Several limitations should be considered when interpreting the synthesis. First, the review targeted the period 2016-2025 to foreground contemporary evidence and to align with rapidly evolving sensing and analytics methods. This temporal focus helps meet the need for recent citations but may under-represent foundational conceptual work in space syntax, environmental psychology, and tourism experience research that predates 2016. Where foundational concepts were needed, the review relied on recent syntheses and applications that reiterate or extend earlier theory [2, 17].

Second, terminology differences across fields may have led to omissions. For example, studies may analyze "network centrality", "connectivity", or "walkability" without using the term "space syntax", and tourism studies may examine "place bonding" or "sense of place" without using standard place attachment scales. The search strategy attempted to address this through broad keyword blocks and Google Scholar screening, but some relevant work may not have been captured.

Third, the evidence base is heterogeneous and often observational. Many studies are cross-sectional and context-specific, which limits the ability to derive general causal claims. While the thematic synthesis identifies plausible mechanisms linking configuration to experience through intensity and satisfaction, these mechanisms should be treated as propositions that require targeted testing through integrated, longitudinal, and quasi-experimental designs [12, 24].

Fourth, the review synthesises evidence on park visitors broadly because many included studies did not report residence status, travel purpose, familiarity with the park or length of stay. Consequently, findings from resident and mixed-visitor samples should not be interpreted as direct evidence of tourist-only pathways. This limitation is addressed in the discussion by treating tourist and resident differentiation as a priority for future research.

Fifth, the screening process was conducted through consensus rather than as a fully independent duplicate coding exercise with retained paired decisions for every record. Therefore, a chance-corrected agreement statistic such as Cohen's kappa could not be reported without reconstructing decisions post hoc. Future reviews should retain paired screening records and report agreement statistics when duplicate screening is used.

Finally, the review did not conduct a quantitative meta-analysis because of measurement heterogeneity in both spatial metrics and intensity/experience outcomes. As the field matures and more studies adopt comparable operationalisations (e.g., shared accelerometer processing standards and shared attachment scales), future meta-analytic work may become feasible and would provide stronger effect-size estimates for planning and policy.

5. CONCLUSION

Urban parks increasingly sit at the intersection of public health, place-making, and tourism. This review synthesised evidence from 2016-2025 to clarify how spatial configuration—captured through space syntax and related network analyses—relates to visitor movement, physical activity intensity, satisfaction, and place attachment. The strongest evidence supports the role of configuration in shaping movement distribution and the role of satisfaction in shaping attachment and loyalty. Evidence linking configuration to physical activity intensity is growing, particularly through studies highlighting the central role of pathways and connected route systems in supporting MVPA. However, fully integrated models that connect configuration → intensity → satisfaction → attachment remain uncommon.

The review contributes an integrative framework and a practical roadmap for interdisciplinary research and planning. For practice, the findings suggest that experience-oriented park planning should treat spatial configuration as part of the visitor experience infrastructure: designing legible networks, distributing attractive nodes, and supporting inclusive, activity-friendly routes can enhance both health outcomes and tourist satisfaction. For research, priority should be given to multi-method, longitudinal, and equity-sensitive studies that align configurational metrics with objective intensity measures and robust experience constructs. Such advances can help cities design urban parks that are simultaneously healthier, more satisfying, and more meaningfully attached places for both residents and visitors.

Beyond academic contribution, the practical urgency of this

agenda is rising. Many cities are simultaneously upgrading flagship parks to attract tourism, expanding green infrastructure to address heat and flooding, and investing in active travel networks to meet physical activity targets. These investments can succeed only if they recognize that people do not experience parks as isolated "green areas" but as sequences of movement, encounter, and meaning-making shaped by spatial configuration. By treating configuration as part of the experience infrastructure—and by measuring how that infrastructure supports intensity, satisfaction, and attachment—future research can provide actionable evidence for designing parks that are not only accessible and beautiful, but also health-promoting, inclusive, and memorable.

Accordingly, future park research should treat spatial configuration, physical activity intensity, satisfaction and attachment as linked outcomes rather than isolated variables. This integrated approach can help cities design urban parks that are accessible, health-promoting, inclusive and memorable for both residents and visitors.

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