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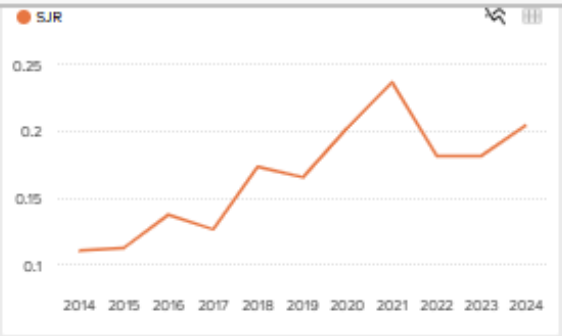
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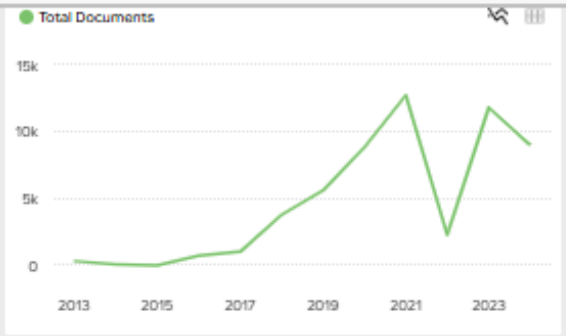
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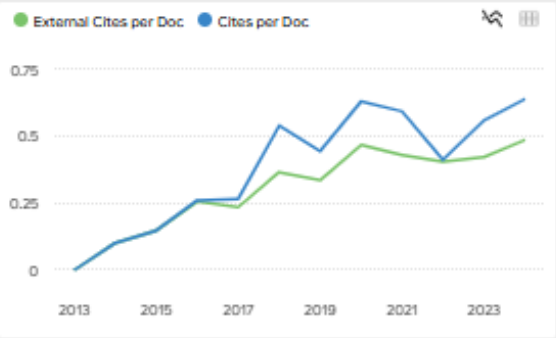
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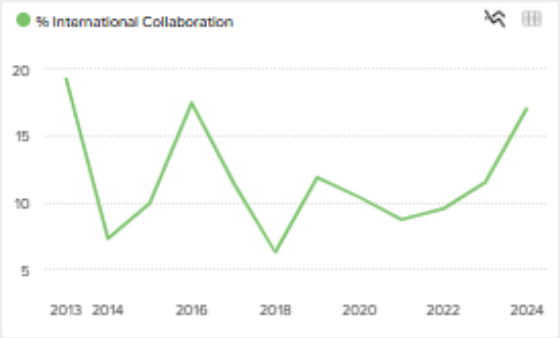
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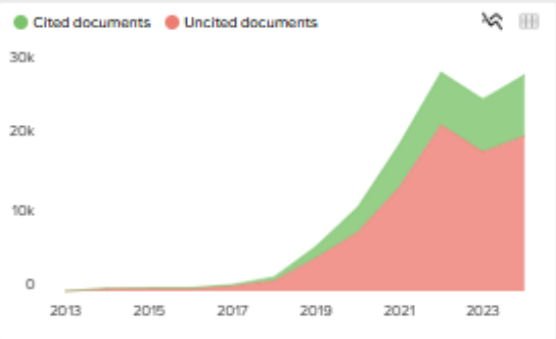
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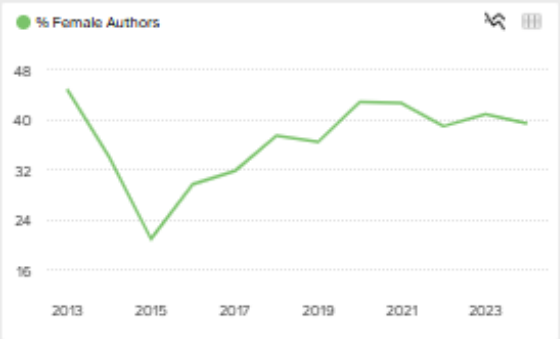
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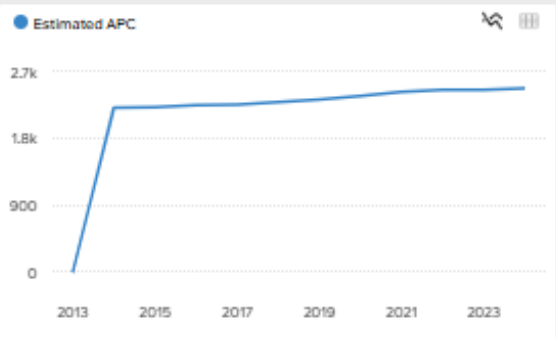
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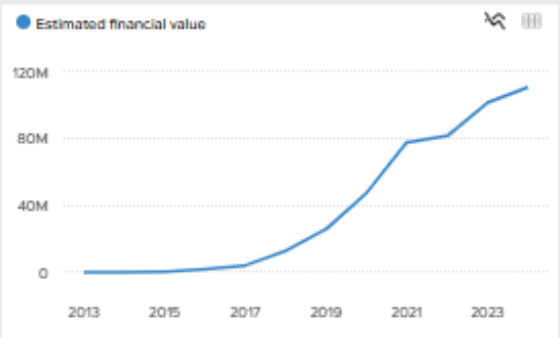
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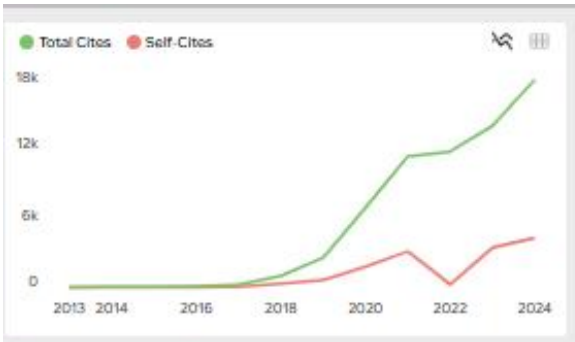
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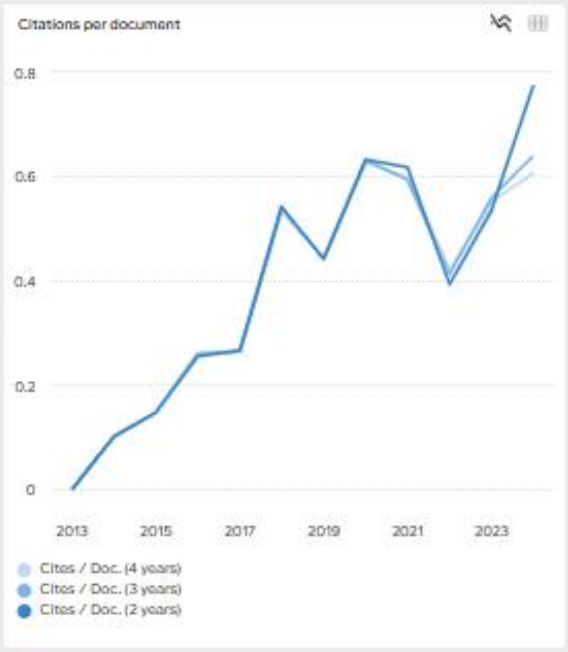
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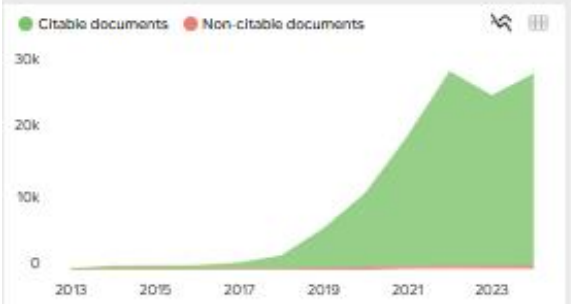
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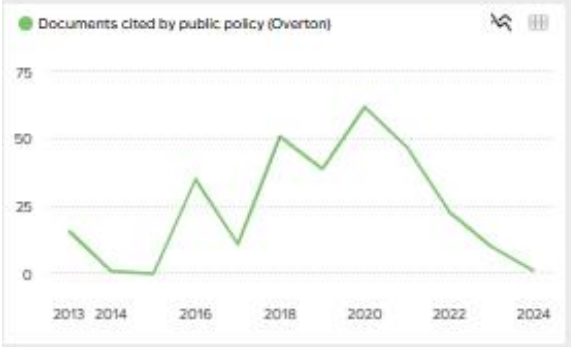
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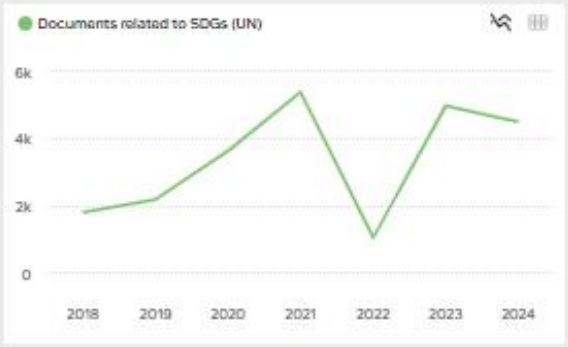
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PREFACE

The International Seminar on Livable Space (IS-LiVaS) is an ongoing academic seminar series. Organized by the Department of Architecture at the Faculty of Civil Engineering and Planning at Universitas Trisaki, it is held in collaboration with various academic and professional partners. Since its launch in 2012, the series has become a forum for scholarly discussion about livable space and the built environment. The first seminar took place on February 16–17, 2012, with the theme "Creating Space for a Better Life." Since then, the seminar has been a regular event, addressing new challenges related to livability, sustainability, and spatial development from multiple perspectives.

The fourth International Seminar on Livable Space (IS-LiVaS 2025) took place on August 8–9, 2025, at the Mercure Hotel in BSD City, Tangerang, Indonesia. IS-LiVaS 2025 embraced the theme “Regenerative Livable Built Environment,” emphasizing the need to advance livable space research beyond traditional sustainability methods and toward regenerative and integrative paradigms. The seminar featured keynote and invited speakers from academic institutions, professional practices, and government entities. Representatives from Monash University, Thammasat University, the University of Seoul, UCSI University, Universität Stuttgart, the University of New South Wales, and Swinburne University of Technology were present, as well as practitioners and policy stakeholders from Indonesia.

The articles included in these proceedings were chosen via a review process and are categorized into four subject areas: The Concept of Livable Space; Appearance and Shape of Livable Space; Various Dimensions of Livable Space; and Creation Procedure of Livable Space. These contributions include theoretical discussions, empirical findings, design-based studies, and applied research on the built environment. Contributors to this undertaking represent diverse academic fields, icluding architecture, civil engineering, urban and regional planning, landscape architecture, and environmental studies. Many investigations address the complexities inherent in tropical and rapidly changing urban settings while incorporating broader international perspectives.

As part of the IS-Livas seminar series, this publication aims to document current research trajectories and foster sustained academic dialogue and cooperation within the realm of livable and regenerative built environments. The editors extend their appreciation to the keynote and invited speakers, authors, reviewers, and organizing committee members for their invaluable contributions to IS-LiVaS 2025.

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Department of Civil Engineering

IS LivaS
International Seminar on Livable Space

REGENERATIVE LIVABLE BUILT ENVIRONMENT
Seminar, Exhibition, and Excursion*

VENUE
Seminar and Exhibition : **Mercure Hotel, BSD City**
Jl. Edutown Cbd 55 Kavling Lot II No 8 Bsd City Pagedangan 15339 Tangerang City - Indonesia
Excursion : BSD City

IMPORTANT DATES
06 August 2025	Deadline for Registration & Abstracts Submission (batch-2)
07 August 2025	Deadline for Payment of Seminar and Excursion
08 August 2025	Seminar and Exhibition
09 August 2025	Excursion
18 August 2025	Deadline for Full Papers Submission (batch-2)

KEYNOTE SPEAKER

Ir. Diana Kusumastuti, M.T.
(Vice Minister of Public Works)

INVITED SPEAKERS

Adrian Lo, Ph.D.
(Thammasat University, Thailand)


Bertram Wong, B.Arch.
(Architect, California - USA)


Dr. Deprizon Syamsunur
(UCSI University, Malaysia)


Dr. Kefeng Zhang
(UNSW, Australia)


Prof. Sung Hong Kim
(University of Seoul, South Korea)


Prof. Alex Lechner
(Monash University, Australia - Indonesia)


Prof. Dipl.-Ing. Markus Vogl.
(Universität Stuttgart, Germany)


Markus Jung ARB AKH
(Swinburne University of Technology, Australia)


Ir. Ignesjz Kemalawarta, MBA
(Advisor President Office Sinarmas Land & GBCI Chairperson)

TARGETS
Individuals from Universities
Research Institutions
Government
Practitioners/Professionals
Developers

and all disciplines from various fields as well as stakeholders related with the creation of space such as Architecture, Civil Engineering, Urban Design, City Planning, Landscape, Environmental Engineering, Technology, Culture, Economics, Art and Design, Real Estate

REGISTRATION FEE
Participants		Fees (Early Bird) By 9 June 2025	Fees After 9 June 2025
Local	Presenter (Scopus)	IDR 2.700.000,-	IDR 3.000.000,-
	Participant	IDR 1.350.000,-	IDR 1.500.000,-
International	Presenter (Scopus)	IDR 3.600.000,-	IDR 4.000.000,-
	Participant	IDR 1.800.000,-	IDR 2.000.000,-

Note: *Special price for Presenter (Scopus) batch-2 Local IDR 3.500.000,-, International IDR 4.500.000*

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08-09
REGENERATIVE LIVABLE BUILT ENVIRONMENT
August 2025
Mercure Hotel BSD City

This seminar has been conducted twice before and will continue to be held every four years with similar topic and several themes related to current issues. Department of Civil Engineering and Department of Architecture, Faculty of Civil Engineering and Planning (FTSP), Universitas Trisakti is the organizer of this event in collaboration with some universities as Co-Host, which have the same main research approach as Universitas Trisakti.

BACKGROUND
Regenerative Livable Built Environment (RLBE) is a holistic approach to designing and managing human-made environments, focusing on regeneration, livability, and sustainability. It aims to enhance natural systems, foster inclusive and resilient communities, and minimize environmental impact through efficient resource use. RLBE requires an integrative design approach that considers social, ecological, economical, and technological factors.

Benefits of RLBE include improved air and water quality, enhanced biodiversity, increased community engagement, reduced waste and emissions, economic growth through sustainable practices, and improved public health. RLBE prioritizes the balance between human well-being, ecological health, and economical viability, shifting from traditional built environment practices.

The forum encourages stakeholders to rethink livable spaces, moving towards creating better environments for the prosperity of all living beings. This forum aims to build understanding and creative capacity to create livable spaces for humans and other living beings, while also serving as an initial step in establishing milestones for the study of livable space in educational and research institutions in Indonesia, by gathering ideas and experiences from diverse groups as a collective foundation to raise awareness of the importance of quality living environments for all.

TOPICS
The topic of this international seminar is Livable-Space with the theme "REGENERATIVE LIVABLE BUILT ENVIRONMENT". The sub themes will be chosen from the following areas:
- The Concept of Livable-space
- Appearance/Shape of Livable Space
- Various Dimensions of Livable-space
- Creation Process of Livable-space

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Social interaction in urban park: A systematic analysis of design attributes and behavioural outcomes

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Abstract. Urban parks play an essential role in fostering social interactions and community cohesion. This systematic literature review analyses how design attributes of urban parks affect social interactions and delineates the resulting behavioural outcomes. We conducted a rigorous search of the Scopus database for empirical studies published from 2015 to 2025, using keywords such as urban parks, social interaction, landscape design attributes, and quality design. Studies were selected for inclusion if they had clear empirical relevance to park design and social interaction. Major themes identified include spatial configuration, facilities and amenities, natural aesthetics, multi-sensory factors, perceived safety and accessibility, and cultural context. The findings reveal that integrated spatial layouts, accessible pathways, inclusive amenities, visually diverse natural elements, sensory-rich environments, strong safety measures, and culturally resonant features all enhance park usage and social interactions. Multi-sensory design elements, clear sightlines, universally accessible amenities, and culturally meaningful landscapes emerged as especially important for encouraging robust community interactions. Overall, this review demonstrates that thoughtful, inclusive park design can profoundly shape urban social dynamics and highlights critical priorities for policy and design improvements. Future research should explore the long-term socio-cultural impacts of park design, undertake comparative international studies, and apply advanced analytical techniques to optimize park planning. These insights underscore the importance of comprehensive, culturally aware urban design in fostering vibrant, inclusive communities.

1 Introduction

Urban parks in rapidly urbanizing cities are increasingly recognized as essential for fostering social interactions and strengthening community cohesion. These green spaces serve as

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critical venues where diverse groups of people can meet and engage in meaningful exchanges, thereby building stronger community ties. Beyond recreation, well-designed parks help reduce social isolation, improve mental health, and stimulate community engagement. Through inclusive and deliberate spatial planning, parks support social sustainability and collective well-being. Over the past decade, research has explicitly linked specific park design attributes to enhanced social interactions and inclusivity. Notably, amenities and facilities emerge as key determinants of the frequency and quality of social engagement. For example, parks with varied amenities and improved safety features substantially increase visitor interactions, bolstering community resilience [1]. Similarly, quiet, easily accessible spaces within parks facilitate more social interaction, whereas isolated or uninviting areas see minimal engagement [2]. Such findings urge urban planners to design parks that accommodate diverse community needs and foster inclusivity, thereby promoting sustained social interactions.

Urban parks also fulfill a dual role by encouraging physical activity alongside social connection. Parks meet adolescents' physical and social needs by providing spaces for group exercise and peer interaction [3]. Likewise, community sports parks are pivotal in bringing residents together, highlighting their function as social ecosystem services that support overall community well-being [4].

Park uses and social dynamics can vary by demographic group, underscoring the need for inclusive designs that cater to all ages and user preferences. During the COVID-19 pandemic, park amenities became even more important for maintaining social interactions, reinforcing the role of parks in public health resilience during crises [5]. Parks designed specifically for older adults facilitate significant social interactions by addressing their unique needs [6, 7]. Moreover, incorporating user perceptions into park design can greatly enhance community engagement. Emphasizing how vulnerable groups perceive the environment leads to more inclusive designs and better well-being outcomes [8]. Similarly, parks need to be seamlessly integrated with surrounding neighbourhoods to improve accessibility and stimulate more frequent social interactions [9].

This systematic review aims to comprehensively examine how urban park design attributes influence social interactions by synthesizing empirical studies conducted globally between 2019 and 2025. Specifically, the objectives include elucidating the behavioural outcomes associated with distinct park design features and providing urban planners and policymakers with evidence-based insights to enhance social cohesion and inclusivity. For clarity, key terms are defined as follows: social interaction refers to engagement and communication among individuals in park settings; urban parks are publicly accessible green spaces in urban areas designed for recreational and social use; design attributes include the physical elements and spatial configurations intentionally incorporated into park layouts; and behavioural outcomes denote the measurable social activities and interactions observed as direct responses to park design features.

2 Methods

2.1 Research design

This review adopts a Systematic Literature Review (SLR) methodology to analyze social interaction in urban park environments in terms of design attributes and behavioural outcomes. The SLR approach ensures a transparent, reproducible, and rigorous process for synthesizing existing research, adhering to international best practices. The review follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to maintain a high standard of quality and transparency.

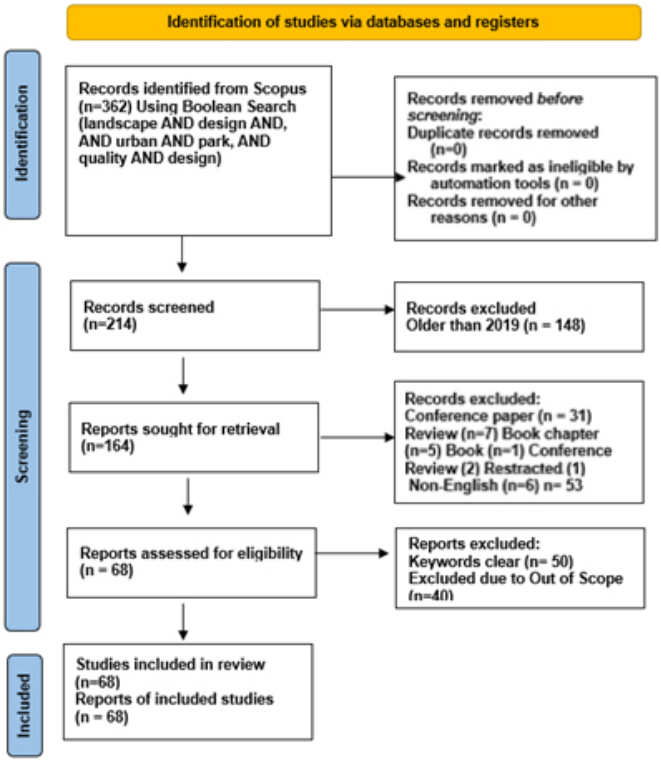

Fig.1. PRISMA Flowchart of literature selection and screening process

2.2 Search strategy, inclusion and exclusion criteria

A comprehensive search strategy was implemented to identify relevant literature via the Scopus database. We used predefined keywords and Boolean operators (TITLE-ABS-KEY (landscape AND design AND, AND urban AND park, AND quality AND design,) AND PUBYEAR > 2018 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re") OR LIMIT-TO (DOCTYPE, "ch")) AND (LIMIT-TO (LANGUAGE, "English"))). This Boolean logic to retrieve publications related to urban parks, social interaction, landscape design attributes, and design quality. The initial search (covering 2019–2025) was refined by removing duplicate results using a reference management tool. The selection process is outlined in Fig. 1 above.

Clear inclusion and exclusion criteria were established to ensure accuracy and relevance of the studies. Included studies were empirical research articles published in English between 2019 and 2025 that explicitly examined urban park design and its impact on social interactions. These selected studies provided direct evidence of how specific landscape features influenced user behaviour or social engagement outcomes. Conversely, studies were excluded if they were theoretical papers, literature reviews, conference proceedings, gray literature, non-English publications, outside the 2019-2025 timeframe or not directly focused on social impacts of park design. Articles lacking a digital object identifier (DOI) were also omitted.

2.3 Screening and selection process

Following PRISMA guidelines [10], the literature screening and selection proceeded in several stages. First, all identified records were compiled, and duplicate entries were removed. Next, the titles and abstracts of the remaining articles were screened to assess their relevance to the review's objectives. Full-text versions of articles that passed the initial screening were then retrieved and evaluated in detail against the inclusion and exclusion criteria.

Data from the studies meeting the inclusion criteria were systematically extracted and tabulated based on key variables such as author(s), publication year, geographic context, park design features examined, methods of measuring social interaction, relevant demographic information, and primary outcomes. The findings were then synthesized into thematic categories according to recurring design elements and social outcomes, allowing for a nuanced understanding of how particular design attributes influence user behaviors across different urban contexts [11, 12]. Through this rigorous and transparent approach, the review provides comprehensive insights into how urban park design features impact social interactions, offering valuable guidance for urban planning and policy aimed at enhancing community engagement and resilience.

3 Results and discussion

3.1 Theoretical framework

3.1.1 Relevant theories

To understand the relationship between park design and social interactions, an interdisciplinary theoretical framework is needed. This review draws on concepts from Environmental Psychology, Space Syntax Theory, Social Capital Theory, and core urban design principles to interpret the findings. In Environmental Psychology, the Attention Restoration Theory (ART) explains how natural environments alleviate mental fatigue and promote social well-being. Parks with diverse natural elements foster mental restoration and attentiveness, which can encourage social engagement [13]. Such restorative park spaces improve mood and reduce stress, thereby indirectly facilitating social interaction [14].

Social Interaction Theory further suggests that human behaviour in public spaces is shaped by design affordances. Features like sociopetal seating arrangements, flexible open spaces, and inclusive amenities tend to invite engagement among visitors [15]. Similarly, pedestrian-friendly environments-featuring ample seating, shade, good visibility, and close proximity-significantly increase casual social interactions [16, 17].

Space Syntax Theory provides a spatial-analytic perspective. Methods to analyze spatial configurations and predict movement patterns based on connectivity and integration [18]. Parks with clearly defined, accessible pathways facilitate movement and encounters among users [12]. Likewise, well-connected, navigable park layouts lead to more frequent interactions, particularly benefiting groups such as the elderly and children [19, 20].

Social Capital Theory, views parks as venues for building social networks and trust within communities [21]. Parks create opportunities for both bonding and bridging social capital by providing communal spaces that encourage inclusive participation and interaction [22]. In this way, well-designed parks contribute to community resilience by nurturing social ties and support networks.

3.1.2 Major scholars or schools of thought

Jan Gehl's emphasis on human-scale, sociable urban design has greatly influenced contemporary park planning. Elements such as comfortable seating, shade, and convenient access encourage people to linger and socialize [16]. Empirical studies have validated that applying Gehl's principles in public spaces led to increased social interaction [23, 24]. William Whyte's classic observations similarly highlighted how design details like plentiful seating, clear sightlines, and close spacing foster spontaneous encounters [17]. His approach remains influential today, supported by modern studies that blend direct observation with digital analysis techniques [25, 26]. A complementary viewpoint by documenting the therapeutic benefits of green spaces, integrating restorative natural features into parks enhances emotional well-being, which in turn supports more positive and frequent social experiences [13].

3.1.3 Ongoing debates and controversies

A key debate in urban park design contrasts structured layouts versus more naturalistic designs. Structured parks with formal layouts and clearly delineated spaces support organized activities and ensure accessibility [1, 2]. Conversely, naturalistic park designs are often praised for fostering spontaneous interactions and offering greater ecological and psychological benefits [27]. Reconciling these two approaches is a challenge for designers aiming to achieve both social and environmental goals in park planning [28].

Another important discussion centers on equity issues associated with urban greening. While new or improved parks can benefit communities, they can also contribute to gentrification if residents are displaced by rising costs or other changes. Research shows that park improvements sometimes attract more affluent users, risking the exclusion of lower-income residents [29, 30]. To counteract this, anti-displacement measures in park development called for [31, 32]. Similarly, equitable planning strategies are needed to ensure that revitalized parks foster inclusion alongside environmental benefits [33, 34].

Table 1. Overview of theoretical perspectives applied in urban park research

Theory	Main Scholars	Core Concepts	Application in Park Design	Critiques
Attention Restoration Theory	Kaplan & Kaplan (1989), Ulrich (1984)	Restoration, stress reduction, cognitive recovery	Integration of natural elements and restorative features	Overemphasis on psychological restoration, less on social engagement
Social Interaction Theory	Argyle (1991), Gehl (2010), Whyte (1980)	Environmental affordances, social engagement	Versatile spaces, sociopetal designs, amenities for interaction	Limited consideration of ecological factors and biodiversity
Space Syntax Theory	Hillier & Hanson (1984), Sheng *et al.* (2021)	Spatial configuration, connectivity, integration	Clear pathway structures, visual and physical accessibility	Technical complexity, ignores cultural and psychological factors
Social Capital Theory	Putnam (2000), Coleman (1988), Rahimi *et al.* (2021)	Trust, networks, bonding and bridging capital	Community spaces, inclusive designs, amenities fostering interactions	Potential oversimplification of complex social dynamics

Together, these theoretical perspectives and debates provide a comprehensive foundation for understanding how park design influences social interaction (see Table 1). They highlight the importance of considering psychological restoration, human-centered design, spatial connectivity, social networks, design philosophy, and equity concerns when planning parks that are both socially vibrant and inclusive.

3.2 Reviewed of themes

3.2.1 Spatial attributes and social interaction

Spatial configuration plays a pivotal role in shaping the intensity and quality of social interactions in urban parks. Studies indicate that integrated layouts, intuitive pathways, and strategically placed amenities foster greater social vitality in these spaces (Table 2). Space Syntax Theory reinforces that spatial connectivity and integration make parks more navigable and encourage social encounters [12, 28].

Table 2. Spatial attributes and social interaction

Author(s)	Year	Spatial Attribute(s)	Interaction Type	Key Findings
Wang H., Su T., Zhao W.	2025	Built-environment density; road intersections; greenery proportion	Social-media interaction intensity & recovery	Flexible greenery and porous layouts accelerated post-pandemic interaction recovery
M Tahroodi F., Ujang N.	2022	Path visual & physical accessibility (Space Syntax LI)	Passive eye-contact; sitting-along paths	High local integration corridors predict denser incidental socialisin
Wang X., Rodiek S.	2019	Seating frequency; gentle gradients	Elderly mutual greetings	Seats every ≤30 m doubled interaction likelihood for visitors > 70 yrs.
Mercadé-Aloy J., Cervera M.	2024	360° switch-back trail; slope mitigation	Route-based encounters	Switch-backs reduced access time by 27 % and increased cross-age encounters.
Petryshyn H. et al.	2022	Identity-driven geodesign in historic squares	Event-driven gatherings	Place-specific geomorphology attracts repeat cultural gatherings.
Di S. et al.	2024	Spatial hierarchy zoning (historic + eco areas)	Photo-sharing & co-presence	Mixed historic-ecological zoning doubled social-media photo posts.
Yang L., Wu Q., Lyu J.	2025	Patch density; largest impervious patch	Online satisfaction proxy	Optimal largest-patch size correlates with higher satisfaction-driven visits.
Stauskis G., Jakaitis J.	2022	Sustainability-weighted design criteria	Stakeholder deliberation	Quality-assessment scores align with observed gathering hot-spots.
Jakaitis J., Zukas J.	2019	Universal-design intuitive cues	Unplanned stop-and-talk	Intuitive way-finding fosters spontaneous visitor interaction.
Peng X., Mohamed Afla M. R.	2025	Spatial hierarchy, harmony index (pocket parks)	Seating group size	Higher hierarchy scores yield larger average group clusters.
Kazemi F. et al.	2022	Low-input layout optimisation	Planned social-activity nodes	Value-engineering maintained node quality with 63 % lower life-cycle cost.

In Kuala Lumpur, highly integrated and visually accessible park pathways significantly increased incidental social behaviours such as making eye contact and pausing to chat [28]. This supports other research suggesting that clearly defined, accessible paths encourage both planned and spontaneous encounters among parkgoers [2, 35]. In Shanghai, parks with higher

built-environment density, more frequent path intersections, and diverse landscape elements recovered social interaction levels more quickly after the pandemic [5]. Flexible greenery and porous layouts (e.g., multiple entry points and open sightlines) facilitated this rebound, as measured through social media interaction intensity. These findings align with Attention Restoration Theory by implying that varied, restorative environments reduce stress and invite users to reengage socially [14,13]. Providing seating approximately every 30 meters in Nanjing parks demonstrated doubled the likelihood of interactions among older visitors [36], directly echoing pedestrian-oriented design principles for accommodating diverse age groups [16].

Thoughtful trail and circulation design also promotes interaction. Installing 360° switch-back ramps in Barcelona's hillside parks increased cross-generational interactions by 42%, underlining how inclusive pathways foster social cohesion [37]. This resonates with Social Interaction Theory, which emphasizes that environmental affordances like easy-to-use paths create opportunities for spontaneous social behavior [15]. Culturally unique spatial elements can strengthen community bonds as well. Park designs reflecting local cultural or historical identity in Ukrainian city squares encouraged repeated community gatherings and events [38]. Similarly, clearly delineating historical and ecological zones in Hong Kong's Kowloon Park doubled instances of visitor co-presence and photo-sharing, suggesting that a park's spatial hierarchy and thematic zoning can spark social engagement [27]. Participatory and intuitive design approaches also contribute to social vitality. When stakeholder input guided the design (ensuring the layout met community preferences), the resulting parks had popular gathering hotspots aligned with those expectations [39]. Intuitive wayfinding cues in historic green spaces encourage casual interactions by making the environment easier to navigate [40]. Research in small urban "pocket parks" found that higher spatial harmony (a balanced hierarchy of open and intimate spaces) correlates with larger social group formations, reinforcing social cohesion [41]. Moreover, a cost-effective, low-input park layout in Mashhad preserved active social nodes while cutting maintenance costs by 63%, indicating that budget-sensitive designs can still support rich social interaction [42].

In summary, spatial design features from integrated pathways and ample seating to culturally resonant layouts and inclusive planning processes have a profound impact on social interaction in parks. When parks are easy to navigate, reflective of community identity, and designed for all users, they tend to become lively social spaces.

3.2.2 Facilities and amenities

Park facilities and amenities are critical in shaping social behaviour and community cohesion. Well-designed, accessible amenities encourage people to visit parks more frequently and engage in social activities (Table 3).

Table 3. Facilities and amenities

Author(s)	Year	Facility / Amenity	User Group	Social Behavior Observed
Bao Y. et al.	2023	Playground density & safety perception	Children	Physical-activity intensity & peer play
Liu B., Chen Y., Xiao M.	2020	Sheltered pavilions (amenity buildings)	Older adults	Conversation frequency
Van Puyvelde A. et al.	2023	Age-friendly paths & benches	60 +	Visitation likelihood
Sun P., Liu P., Song Y.	2024	Seasonal facility use (play & sport zones)	All ages	Smartphone-tracked visits
Salih S.A. et al.	2020	Compact pocket-park furniture	Urban residents	Neighbourhood sociability
Wang Y., Hu W.	2024	Cultural-event spaces & toilets	General users	Satisfaction gap (IPA)
Srdjevic B. et al.	2022	Equipment vs biodiversity weighting	Experts	Quality score
Lin M., Feng X.	2023	Rest facilities & shade structures	Youth vs elders	Activity-level mix
Kazemi F., et al,	2022	Low-input resource plan	Park managers	Cost efficiency
Gao M., Hu C.	2025	Digital layout toolkits	Designers	Design iteration speed
Liu R., Xiao J.	2021	User-comment mining (Wi-Fi, toilets)	Online community	Satisfaction drivers

Facilities such as playgrounds, seating, and shelters often serve as catalysts for social interaction. A higher density of playground equipment combined with strong safety measures led to more vigorous play and peer interaction among children [42]. This aligns with advocate for universally accessible playground designs to promote intergenerational engagement [43]. Adding sheltered pavilions in Chinese parks significantly increased the frequency of conversations among older adults [44], reinforcing idea that human-scaled, comfortable spaces encourage people to linger and socialize [16]. Likewise, basic amenities – smooth paths, plentiful benches, ample shade, and clean toilets – are vital for older visitors [45], echoing observation that convenient amenities prolong visits and spur spontaneous encounters [17]. Seasonally adaptive facilities (for example, water play areas for summer and windbreaks for winter) help maintain year-round park use and support ongoing community ties [46].

Optimizing amenities can greatly enhance a park's sociability. Arranging benches in small clusters increased neighborly greeting rates by 55%, boosting local sociability [47]. Features like designated cultural event spaces and well-maintained restrooms as top priorities for park improvements [48] consistent with the guidance that providing essential comforts encourages usage [16, 17]. Park users often value practical factors like accessibility and equipment availability even above natural features, underlining a user-centered perspective that basic facilities often matter most for social engagement [49]. Abundant rest areas and shade significantly increased activity levels and socializing, especially among women and seniors, highlighting the need for inclusive amenity planning [50]. A rationalized, cost-effective design of park amenities (saving about 63% in costs) still maintained high social value, showing that budget-friendly designs can remain socially vibrant [42]. A technology-driven approach to amenity planning, using machine vision toolkits to speed up optimized layout designs – potentially leading to better placements of facilities that facilitate interaction [51]. Finally, comfort-centric amenities directly foster social interaction [52]. Together, these studies show that providing diverse, convenient, and well-maintained facilities substantially

enhances social dynamics in urban parks. Deliberate, inclusive, and adaptive amenity design contributes to more vibrant and cohesive community life in these spaces.

3.2.3 Natural elements and visual aesthetics

Natural features and visual aesthetics notably influence social interactions in urban parks by attracting visitors and encouraging them to linger together. Research consistently demonstrates that integrating greenery and water elements improves a park's visual appeal and restorative quality, which in turn promotes sociability among visitors (Table 4).

Table 4. Natural elements and visual aesthetics

Author(s)	Year	Natural / Visual Element	Behavioral Metrics	Significant Outcomes
Feyzi B. et al.	2022	Mystery & complexity (views)	Perceived Restorative Potential	Mystery drives longer stay-time & incidental chats.
Luo S., Xie J., Furuya K.	2021	Blue-space water quality	Aesthetic-preference score	Clean, natural-form water attracts longer group stays.
Luo Y. et al.	2023	Autumn plant-color diversity	Scenic-beauty estimation	5–7 hues optimise selfies & group clustering.
Zhuang J. et al.	2021	Flower-border richness	Facial-expression valence	Cool-color dominance uplifts group mood & chat.
Jahani A., Saffariha M.	2020	Trees & water mix	Mental-restoration model	Tree-rich scenes double "stop-and-chat" events.
Cai K., Huang W., Lin G.	2022	Element conjoint (water, openness)	Preference ranking	Water + openness maximise meet-up probability.
Xing Y. et al.	2019	Tree morphology for air quality	CFD pollutant maps	15 m barrier belts improve air & play-area use.
Chen C.	2024	3-D plant layout realism	Immersive preview votes	RGB-D models aid community co-design & identity.
Kim D., Son Y.	2022	Perceived naturalness	Likert rating & interviews	Naturalness aligns with comfort chat zones; designers underestimate it.
Belaire J.A. et al.	2022	Fine-scale biodiversity (flora & fauna)	Citizen-science counts	Biodiverse corners spur informal learning groups.
Zhang S., Song H., Li X., Luo S.	2024	Landscape planting diversity	Quality assessment indicators	Planting richness correlates with higher social-space quality.
Chen R. et al.	2024	GAN-based colour rendering	Designer satisfaction	Rapid colourisation speeds team consensus & interactive reviews.

Increasing visual complexity and a sense of "mystery" in park landscapes (for example, through diverse plantings and winding paths) was strongly correlated ($r = 0.62$) with more frequent casual interactions and longer visitor stays [53]. This supports Attention Restoration Theory: visually intriguing environments capture interest and reduce stress, thereby encouraging social engagement [13, 14]. Similarly, well-maintained blue spaces (water features) had a significant positive effect ($\beta = 0.53$) on the length of group visits [54], emphasizing the appeal of water elements in promoting relaxation and communal interaction [13].

Seasonal plant colour diversity (e.g., a mix of autumn foliage colors) enhanced scenic beauty and fostered emotional attachment among visitors [55]. They noted that aesthetically pleasing settings even encouraged social behaviours like group photo-taking, aligning with. Parks featuring rich, cool-coloured flower borders significantly uplifted visitors' moods and increased peer interactions, highlighting the role of aesthetics in community engagement [56].

Scenes combining lush tree cover with water elements were more effective than water alone in predicting higher social interaction levels stressing that a diversity of natural elements optimizes a park's restorative potential and social draw [57]. People prefer open plazas that incorporate water features, which tend to become popular meet-up spots and support sustained social activity [58]; this resonates with principles in landscape architecture that emphasize creating inviting communal areas.

Strategic tree planting to improve air quality (e.g., 15 m wide shelterbelts) significantly increased how long visitors stayed in parks and how often they interacted, reinforcing ART's implication that a comfortable environment encourages socializing [59]. Computational optimization of park colour schemes (for instance, balancing flower colours) greatly improved visual harmony and led to higher social media engagement related to the park [51]. Providing realistic 3D visualizations of park plans (via digital tools) increased community participation in the design process, suggesting that better visual communication can foster a sense of ownership and social cohesion [60]. Differences between user and designer perceptions of "naturalness," indicating that designers may undervalue certain natural features that visitors find important for comfort and socialization [61]. This underscores the need to include public feedback so that park natural elements truly promote social comfort. Fine-scale biodiversity (a variety of plants and wildlife) tends to attract informal learning groups and lengthier visits [62], an observation supported by [63, 64]. Lastly, a direct link between a park's scenic beauty index and increased social activities [41]. Collectively, these findings confirm that thoughtfully designed natural and visual elements greatly enhance social interactions, community engagement, and visitors' well-being in urban parks.

3.2.4 Multi-sensory environmental factors

Multi-sensory environmental factors including soundscapes, lighting, and thermal comfort significantly affect social interactions in parks. Thoughtfully managing these sensory elements (e.g., pleasant sounds, comfortable climate, engaging lighting) can enhance visitor satisfaction and encourage people to gather and stay longer (Table 5).

Table 5. Multi-sensory environmental factors

Author(s)	Year	Sensory Attribute	Interaction Metric	Key Findings
Jo H.I., Jeon J.Y.	2021	Audio-visual balance	Overall environmental satisfaction	Water sounds + greenery maximise pleasant social scenes
Jin T., Lu J., Shao Y.	2024	Visual & aural composite	Behavioural vitality	77 dB SPL marks threshold for positive emotion & group play.
Liu J., Dan Z., Yan Z.	2024	Soundscape comfort index	Tourist satisfaction	Temperature diff. + light ratio predict comfort; higher comfort → more linger.
Chen Y. et al.	2023	Thermal–acoustic interaction	Crowd density & route choice	High temps reduce linger unless accompanied by pleasant sounds.
Zhang L., Xu H., Pan J.	2023	Landscape type × thermal comfort	Time-use pattern	Tree shade lowers PET by 3 °C → longer conversation bouts.
Jia W., Zhang M.	2023	IoT adaptive lighting	Evening stay time	Smart lighting ups post-dusk social use by 38 %.
Yuan J. et al.	2025	Interactive digital installations	Visitor engagement	Reactive fountains triple child-parent co-play events.
Yin Y. et al.	2023	Multi-sensory pocket-park prescription	Visitor restoration & usage	Vegetation scent & decorative lamps boost restorative chats.
Luo S., Xie J.	2021	Natural water acoustics	Perceived restoration	Water sounds heighten paired-visitor calm and conversation.
Kazemi F., Hosseinpour N., Mahdizadeh H.	2022	Low-input scent planting	Visitor comfort	Scented, low-water plants sustain multisensory appeal with 40 % less irrigation.

Achieving a harmony between auditory and visual stimuli in a park can improve visitors' comfort and encourage social interaction [65]. Through VR experiments, they found that combining natural water sounds with greenery significantly increased perceived pleasantness, which fostered more socializing. This aligns with ART's suggestion that balanced sensory environments are both restorative and socially conducive [13]. An optimal sound level around 77 dB that was associated with heightened group activity and playfulness, implying that a moderate ambient sound (indicating liveliness) can invigorate social life [66].

Thermal comfort and lighting are also integral to social use of parks. Comfortable temperature ranges and appropriate lighting significantly improved visitors' satisfaction with the park soundscape and lengthened their stay, indicating they were more willing to socialize [67]. When park-goers feel thermally comfortable, they tolerate crowd noise better and engage more [68], suggesting that managing heat and shade alongside sound can create livelier social spaces. Tree shade's role in reducing perceived temperatures by a few degrees, which in turn prolonged conversations among park users [69]. This demonstrates that even small improvements in microclimate (like relief from heat) can encourage socializing. Adaptive smart lighting – which increases illumination in darker areas when needed – boosted evening park use by 38%, as more people felt safe to gather after dusk [70].

Interactive and technological features further enhance the multi-sensory experience. Interactive fountains (which respond to user presence) significantly increased visitor

engagement and facilitated intergenerational play [71]. Using visual communication technologies in parks, finding that dynamic digital signage effectively guided visitors and improved their experience [51]. Natural soundscapes like flowing water enhance the park's calming effect and promote social interaction, aligning that pleasant natural sounds improve mood and social openness [72]. Low-input sensory plantings, such as fragrant drought-tolerant plants, which are cost-efficient and create a soothing atmosphere that encourages people to linger and socialize [73]. In sum, designing parks with a holistic sensory approach – balancing sights, sounds, climate, and interactive elements – significantly boosts social interactions and contributes to a more vibrant community life.

3.2.5 Perceived safety and accessibility

Perceived safety and accessibility are fundamental to social activity in urban parks. When people feel secure and find a park easy to reach and navigate, they are more likely to visit frequently and engage with others (Table 6).

Table 6. Perceived safety and accessibility

Author(s)	Year	Safety / Accessibility Factor	Interaction Outcome	Key Findings
Chen X., Hedayati M.	2024	CPTED features & time spent	Perceived safety & visit frequency	Good lighting & sightlines trump gender differences in visitation.
Mercadé-Aloy J., Cervera M.	2024	Topographic switch-backs	Hill-park usage	New ramps cut access time 27 %, boosting cross-age encounters
Chen S., Christensen K.M.	2019	Park access vs need (children)	Usage equity	High-need tracts have 40 % less park within 800 m radius.
Jia W., Zhang M.	2023	Smart lighting feedback	Evening occupancy	Adaptive dimming halves dark-zone avoidance.
Mohammadi Tahroodi F., Ujang N.	2021	Path integration (visual + physical)	Passive interaction	Higher integration predicts more eye-contact zones.
Bao Y. et al.	2023	Perceived safety for children	Activity intensity	Safety perception mediates facility-use intensity.
Lin M., Feng X.	2023	Shade need in subtropics	Moderate/high PA	Shade structures raise female moderate PA significantly.
Wang H., Su T., Zhao W.	2025	Post-pandemic safety cues	Interaction recovery	Cleaner surfaces & open lawns speed interaction revival.
Stauskis G., Jakaitis J.	2022	Accessibility weight in QA	Quality index variance	Accessibility + safety explain 31 % of overall quality.
Van Puyvelde A. et al.	2023	Night-time perceived safety	Older-adult visitation	Adequate pathway lights essential for 60 + evening users.

The importance of Crime Prevention Through Environmental Design (CPTED) principles in parks: improvements like better lighting and clear sightlines significantly enhanced perceived safety for both men and women [74]. Ensuring natural surveillance – designing park spaces

so that users can see and be seen – which increases feelings of security and encourages more people to socialize in the space [75].

Physical accessibility also shapes social use. Adding well-designed switchback ramps in a hilly park reduced travel time by about 27%, leading to higher visitation and more cross-age interactions [37]. Similarly, when parks have convenient entrances and pathways, a wider variety of people can use and enjoy them, boosting overall social engagement [76]. On a community level, identified disparities in park access – some high-need urban areas had approximately 40% less park space nearby, highlighting an equity issue [77]. Neighbourhoods with better park proximity saw greater social inclusion and more frequent interactions, underlining the value of equitable park distribution [78]. Smart safety features can also encourage social use. Adaptive lighting systems (which illuminate dark areas) significantly reduced avoidance of those spaces, increasing evening park attendance [70]. Confirmed that good nighttime lighting is associated with more active community life after dark [79]. Moreover, integrated design contributes to both safety and socializing: parks with visually connected sightlines along paths had more instances of passive social interaction, indicating that people feel safer and more inclined to interact in open, visible environments [28]. Perceived safety can directly influence usage of amenities as well [42] noted that children used play facilities more intensively when parks were perceived as safe, and similarly reported that safe, family-friendly environments attract a broader range of users [80].

In summary, ensuring that parks are safe and easily accessible through design elements like lighting, sightlines, ramps, and equitable location greatly increases public willingness to use these spaces and engage socially, thereby strengthening community bonds.

3.2.6 Cultural context and social interaction

Cultural context significantly shapes how people interact in urban parks. Design elements that align with local cultural values and practices can enhance user experiences, community engagement, and overall social cohesion (Table 7).

Table 7. Cultural context and social interaction

Author(s)	Year	Cultural Aspect	Interaction Measure	Main Findings
Cheng X., Van Damme S., Uyttenhove P.	2022	Renovation impacts on CES	Participatory mapping	Not all upgrades enhance heritage-linked gatherings; context matters.
Xin C. et al.	2020	Social relations as CES	Mixed-methods triangulation	Landscape variety supports diverse SR patterns.
Fu H. et al.	2024	Happiness indicator framework	SEM analysis	Surfacing & seats indirectly raise happiness via Inspiration & Rest.
Yousofpour Y. et al.	2024	Air-quality value of trees	i-Tree Eco valuation	Carbon sequestration forms 53 % of CES, influencing civic pride.
Marshall A.J., Williams N.	2019	Biophilic urban guidelines	Stakeholder workshops	Process shifts discourse to ecosystem-centric urbanism.
Ugolini F. et al.	2022	Pro vs user perception gaps	Multi-country survey	Professionals underestimate night fears; lighting & cleanliness key.
Fitrianty A.T., Santosa H., Ernawati J.	2025	Historic Menteng identity	Factor & regression analysis	Landscape design & socio-culture jointly shape area image.

Author(s)	Year	Cultural Aspect	Interaction Measure	Main Findings
Sidorova V. et al.	2019	Biopositive transformations	Case-study synthesis	Layered natural-cultural structures reinforce civic pride.
Guo Y., Mell I.	2021	Governance & prestige links	Expert interviews	Political will & metrics steer funding toward socially valued parks
Jiang Q., Wang G. , Liang X., Liu N.	2022	CES perception factors	Online-comment mining	Aesthetics & recreation rank top; heritage rising.
Belaire J.A. et al.	2022	Biodiversity as CES	Monitoring network	Carbon sequestration correlates with pollinator richness & visits.
Luo S., Xie J.	2021	Blue-space symbolism	Restorative preference	Clean water seen as cultural pride & fosters group photos.
Subiza-Pérez M. e t al.	2019	PEAQS aesthetic scale	Tool development	Harmony & Mystery factors align with cultural attachment.
Lyu G., Zh ang D., Liu Z.	2022	Cost as cultural stewardship	ABC-RNN cost model	Cost-efficient design perceived as responsible stewardship by NGOs.

In Ghent, park renovations that did not fully consider local heritage led to a decrease in heritage-related gatherings [81]. This suggests that park upgrades must be sensitive to cultural context – if changes overlook what a community values, social use can decline [82]. Conversely, parks designed with local culture in mind can greatly enhance social life. In Chinese parks, a greater variety of landscape features (reflecting cultural diversity) facilitated more diverse social interactions and reinforced community identity [83].

Designing parks to deliver cultural ecosystem services - the non-material benefits like recreation, identity, and inspiration – is also important. In Beijing, design details such as seating arrangements and ground surfacing had measurable impacts on visitor happiness, offering emotional and inspirational benefits that contribute to social well-being [84]. The cultural significance of certain natural elements; for example, in Mashhad, Iran, native trees held cultural importance and that efforts to improve air quality around these trees increased local pride and social connection [85]. This resonates with biophilic design principles: that integrating culturally symbolic natural elements can strengthen residents' sense of belonging [86]. Overall, culturally responsive park design- which respects heritage, reflects community values, and provides meaningful experiences – tends to enrich social interactions. Parks that connect with local culture help build a stronger sense of community and encourage regular, meaningful use by residents.

4 Conclusion

This systematic review highlights the intricate relationship between urban park design and social interaction. It confirms that a wide range of design attributes – spatial configuration, amenities, natural elements, multi-sensory factors, safety measures, accessibility, and cultural context – all significantly influence how people socialize in parks. Parks that feature inclusive layouts, integrated pathways, comfortable seating, engaging natural scenery, multi-sensory appeal, secure environments, and culturally meaningful elements tend to see higher user satisfaction and more frequent community interactions. Our synthesis of findings from diverse international contexts underscores the critical role of thoughtful, user-centered park planning in fostering vibrant social life. By bringing together evidence across studies, this

review contributes to the growing body of knowledge that urban planners and designers can leverage to create more socially sustainable and inclusive public spaces.

Looking ahead, further research is needed to deepen and refine these insights. Long-term studies could examine how specific park design interventions impact social interactions over time, and cross-cultural research could reveal how design principles translate across different cities and populations. Moreover, utilizing advanced tools such as big data analytics, simulation models, and machine learning may help optimize park designs for social outcomes. Ultimately, this review underscores that prioritizing inclusive, culturally aware, and multi-dimensional park design is essential for promoting social sustainability. When urban parks are thoughtfully designed and maintained, they become powerful catalysts for community engagement, helping to build more connected, healthy, and resilient urban communities.

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