World Journal of Engineering Research
ISSN: 2959-9873
DOI: https://doi.org/10.61784/wjer3013

PROGRESS ON URBAN RECREATIONAL GREEN SPACE ACCESS BASED ON BIBLIOMETRIC ANALYSIS

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Abstract: This study systematically reviews the international research progress on urban recreational green space access from 2015 to 2024 based on bibliometric analysis. Through retrieval from the Web of Science database and visualization analysis using CiteSpace tools, the study finds that the number of literature in this field has generally increased over the decade, reaching a research peak in 2021. The degree of cooperation among major research institutions is relatively low, but there are core institutions with high frequency and centrality that drive research progress. Research hotspots focus on the interdisciplinary linkage between urban green spaces and health promotion, the provision of ecosystem services by green infrastructure, the social-spatial differentiation and governance of urban greening, and the behavioral response mechanisms of emotion-environment interaction. Accessibility serves as a key influencing factor, closely related to the fairness of green space resource allocation and residents' health levels. Furthermore, research is deepening from correlation analysis to causal mechanisms and intervention scheme design, exhibiting interdisciplinary expansion and technology-driven trends. This study provides a scientific basis and reference for urban green space planning, policy formulation, and future research directions.
Keywords: CiteSpace; Recreational green space; Research progress; Hotspot issues

1 INTRODUCTION

With the acceleration of global urbanization, urban green spaces, as a crucial component of urban ecosystems, have been the focus of numerous studies. These studies indicate that the accessibility of urban recreational green spaces is one of the key factors influencing the quality of life of urban residents [1], playing an irreplaceable role in promoting sustainable urban development and enhancing residents' well-being. The characteristics of urban green spaces encompass multiple dimensions such as type, size, vegetation cover, biodiversity, and ecosystem service functions [2, 3], which collectively determine their ability to improve the urban environment and promote residents' health [4]. Meanwhile, access factors of urban green spaces, including their geographical location, transportation convenience, facility completeness, and safety, directly affect the frequency and satisfaction of residents' green space usage [5-7]. However, as urbanization accelerates, the planning, construction, and management of urban green spaces face numerous challenges, such as the limited availability of land resources, the scarcity of green spaces in densely populated areas, and the inequality in green space access. Therefore, how to reasonably plan and manage urban green spaces to efficiently and equitably serve the majority of urban residents has become an urgent issue to be addressed.

In recent years, there has been a growing body of research on urban green space access, primarily focusing on various aspects such as accessibility, usage frequency, residents' preferences, and socioeconomic disparities [8-10]. By delving into these factors, scientific evidence can be provided for the planning and management of urban green spaces, thereby optimizing their layout and enhancing service efficiency and fairness. Therefore, conducting a visualization analysis of literature related to urban green space characteristics and access factors based on bibliometric analysis [11], including the distribution of journal publishing institutions, major journals, and representative literature, serves to showcase significant research findings and perspectives in this field. Additionally, the visualization of research hotspots and trends offers insights into the research development direction, providing theoretical support and methodological guidance for future research and practice, with the aim of offering theoretical and practical references. Building upon research related to urban recreational green spaces, this paper will perform a visualization and quantitative analysis of foreign literature, systematically summarizing the distribution characteristics of publishing institutions, major journal publications, representative literature, research hotspot themes, and trends. By exploring the research progress of urban recreational green space access, this study aims to provide certain reference values for research in the field of green spaces in China.

2 DATA SOURCES AND RESEARCH METHODS

2.1 Literature Search

The English literature data was retrieved from the Web of Science™ Core Collection using the topic search term "Green space access" (TS=(Green space access)). The search was conducted on March 20, 2025, covering a time span from 2015 to 2024. A total of 1,366 literature entries relevant to the research theme were identified. After deduplication using CiteSpace, the number of valid literature entries was reduced to 1,002. As shown in Figure 1, the publication of

core literature on recreational green space access abroad presents the following characteristics: between 2015 and 2024, the number of relevant literature entries generally showed an upward trend with fluctuations, reaching a peak in 2021. Although there was a decline between 2022 and 2023, the number of published papers remained around 160.

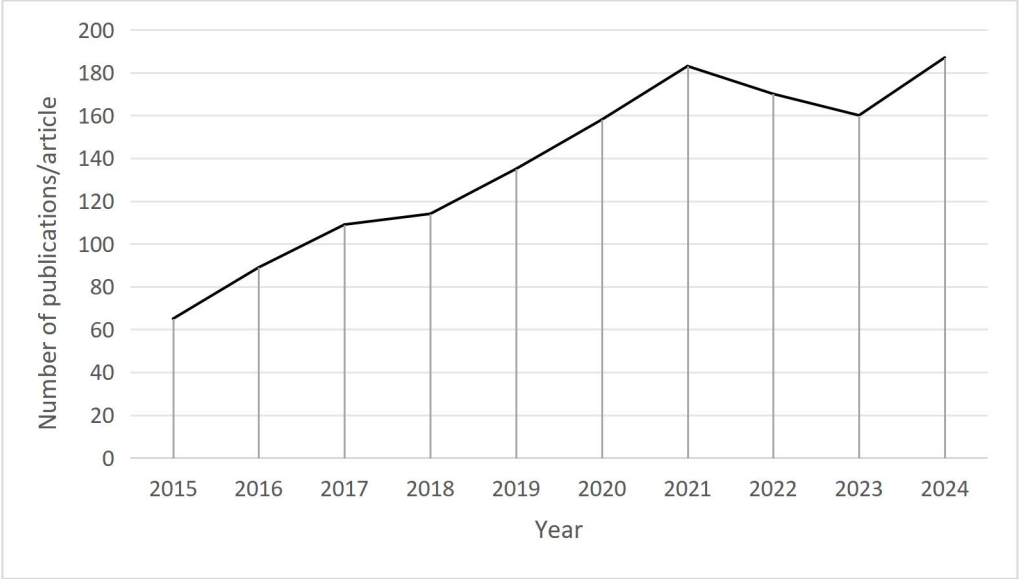


Figure 1 Annual Changes in Literature on Recreational Green Space Access Research

2.2 Knowledge Graph and CiteSpace Tool

A knowledge graph, as a semantic network based on a graph structure, systematically expresses knowledge associations through nodes (entities) and edges (relationships). Its core lies in revealing the inherent correlations and dynamic evolution patterns within complex knowledge domains. It can not only intuitively present the interactions between concepts, scholars, institutions, and literature but also effectively identify core themes in a field through node density and connection strength. Furthermore, it can accurately analyze knowledge flows and emerging directions by relying on chronological graphs. As a bibliometric visualization tool developed by Professor Chaomei Chen's team [12], CiteSpace is specifically designed for generating scientific knowledge graphs. Its advantages are manifested in its support for multiple databases such as WoS, CNKI, and Scopus, its dynamic network analysis capabilities based on time slicing, and its automatic calculation functions for key indicators like frequency, centrality, and burst value. At the macro level, it can comprehensively reveal the development context of a discipline and assist in resource allocation. At the micro level, it can precisely locate research gaps and guide innovative topic selection. At the same time, it can achieve scientific predictions of future research directions with the help of time series analysis. This fully demonstrates the important value of knowledge graphs and the CiteSpace tool in academic research for integrated analysis, trend insight, and frontier exploration.

3 ANALYSIS OF RESEARCH CHARACTERISTICS IN THE FIELD OF RECREATIONAL GREEN SPACE ACCESS AT HOME AND ABROAD

3.1 Research Results of Publishing Institutions

Using CiteSpace software to visualize the collaboration network of research institutions can effectively reveal the geographical distribution of major research institutions in this field and their cooperation patterns and relationships. The resulting co-occurrence and collaboration map of research institutions is shown in Figure 2, which details the collaboration between various institutions. In terms of the number of English literature published, institutions such as Pompeu Fabra University, Arizona State University, University of Hong Kong, Wuhan University, and University of Glasgow have performed particularly well, demonstrating their activity and influence in academic research. Figure 2 contains 259 network nodes and 349 connecting lines, representing 259 research institutions and 349 collaborations or co-occurrence events between them, respectively. The network density of the map is 0.0104, indicating that despite the existence of certain collaborative relationships, the overall level of collaboration between institutions is relatively low. Most institutions lack direct and close collaborative ties. This low-density collaboration network may limit the sharing of academic resources and the dissemination of research findings.

To further analyze the importance of each research institution in the collaboration network, they were ranked from highest to lowest based on centrality indicators, and the top 10 research institutions were selected. The specific results are shown in Table 1. Among them, Australian Catholic University has the highest centrality, reaching 0.47, which is significantly higher than other institutions. This indicates that the institution maintains close cooperative relationships with multiple research institutions and plays a key role in the collaboration network. In addition, research institutions with a frequency exceeding 10 times also include Royal Melbourne Institute of Technology (RMIT) (centrality of 0.37),

University of Western Australia (centrality of 0.31), ISGlobal (centrality of 0.26), Autonomous University of Barcelona (centrality of 0.25), and University of Helsinki (centrality of 0.23). These data show that the distribution of research institutions in this field is relatively concentrated, and these high-frequency, high-centrality institutions have high cooperation intensity and influence in the collaboration network, playing an important role in promoting research progress in this field.

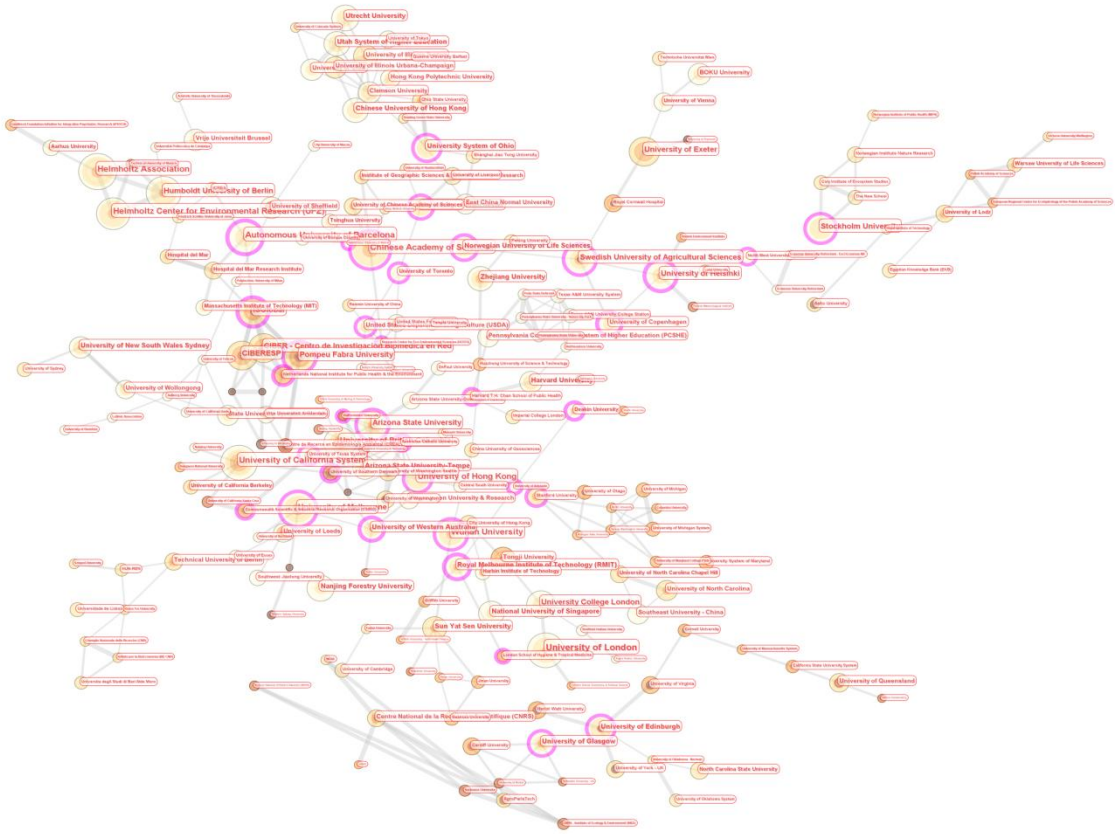


Figure 2 Co-occurrence Map of Publishing Institutions

Table 1 Distribution of the Top 10 Publishing Institutions

Number	Frequency	Centrality	Year of First Appearance	Institution
1	4	0.47	2017	Australian Catholic University
2	14	0.37	2017	Royal Melbourne Institute of Technology (RMIT)
3	13	0.31	2015	University of Western Australia
4	17	0.26	2017	ISGlobal
5	28	0.25	2016	Autonomous University of Barcelona
6	19	0.23	2017	University of Helsinki
7	5	0.23	2015	University of Southern Denmark
8	7	0.22	2019	Deakin University
9	3	0.22	2023	University of Adelaide
10	9	0.21	2021	University of Copenhagen

3.2 Analysis of Citation Frequency of Cited Literature

Based on the burst diagram generated by CiteSpace, this study identified the top four subject categories with a sharp increase in citations, revealing their dynamic evolution and academic impact in recreational green space access research. As shown in Figure 3, the medical field experienced a surge in citations between 2016 and 2020 (intensity 3.86). The main driving factor was the rise of medical tourism research, which focused on the quantification of health treatment intentions, medical tourism destination choices, and service quality, with particular attention paid to the influence of cultural identity, language accessibility, and international certification standards on medical tourism decisions. The field of public, environmental, and occupational health showed significant growth between 2015 and 2016 (intensity 3.5). Its research core centered on the relationship between green space access motivation and mental restoration effects. Through empirical methods, it revealed the positive effects of natural experience motivation on mental recovery and emphasized the differential impacts of green space design elements (such as vegetation coverage and activity space

layout) on populations with different stress levels.

The field of meteorology and atmospheric sciences saw a rise in citations between 2019 and 2022 (intensity 2.66). The research focused on the dynamics of air quality in recreational areas, particularly the coupled effects of motor vehicle exhaust, fugitive dust, and meteorological factors (such as relative humidity and wind speed) on atmospheric particulate matter concentration. Case studies in cities like Fuzhou were used to illustrate the effectiveness of vegetation ecological barriers in reducing particulate matter. The field of ecology experienced significant growth between 2015 and 2018 (intensity 2.63). Its main research focus was on the planning and practice of ecological landscape recreation systems. Through case studies such as the Boston Greenway, it demonstrated the enhancing effect of ecological corridor construction on the comprehensive benefits of urban green space systems and emphasized the synergistic mechanism between green space layout and urban planning.

Subject Categories	Year	Strength	Begin	End	2015 - 2024
MEDICINE, GENERAL & INTERNAL	2016	**3.86**	2016	2020	
PUBLIC, ENVIRONMENTAL & OCCUPATIONAL HEALTH	2015	**3.5**	2015	2016	
METEOROLOGY & ATMOSPHERIC SCIENCES	2019	**2.66**	2019	2022	
ECOLOGY	2015	**2.63**	2015	2018	

Figure 3 Top 4 Subject Categories with the Strongest Citation Bursts

4 ANALYSIS OF RESEARCH HOTSPOTS AND TRENDS

4.1 Analysis of Research Directions and Topics

In each field, keywords are a high-level summary of the research content by the article's authors, which can intuitively reflect the research focus of the article. High-frequency keywords can indicate the research hotspots and trends in the field. By using CiteSpace to plot literature keywords as a knowledge map (Figure 4), it was found that foreign literature covers 432 research directions. Among these, those with a betweenness centrality greater than 0.10 are considered important research areas, and are compiled and presented in Table 2. The keywords ranked by betweenness centrality from high to low are "blue space," "General health," "knowledge," "disparity," "dynamics," "disease," "obesity," "facility," "accessibility," "gentrification," "conservation," "land cover," "open space," "policy," "care," and "connectedness." Among the many high-centrality keywords, "accessibility" appears most frequently, ranking 9th in Table 2. By observing Figure 4, it is found that this keyword is connected to other keyword networks, including "disparity," "quality," "equity," "neighborhood," and "benefits." This further illustrates that in recreational green space access, accessibility is an important factor affecting residents' enjoyment of recreational green spaces. It is not only related to the distribution and fairness of green space resources but also profoundly impacts residents' health levels and quality of life. The keyword "disparity" reveals the uneven state of access to recreational green space resources among different social groups, emphasizing the issue of fairness in resource allocation. The keyword "quality," as another keyword, emphasizes the importance of the quality of recreational green spaces themselves in enhancing residents' user experience. The keyword "equity" further emphasizes the need to ensure that everyone has equal access to high-quality recreational green spaces. The keyword "neighborhood" is closely linked to "accessibility," suggesting that the living environment of residents has a direct impact on their accessibility to recreational green spaces. The keyword "benefits" summarizes the positive impacts of recreational green spaces on residents' physical and mental health, social interactions, and community cohesion.

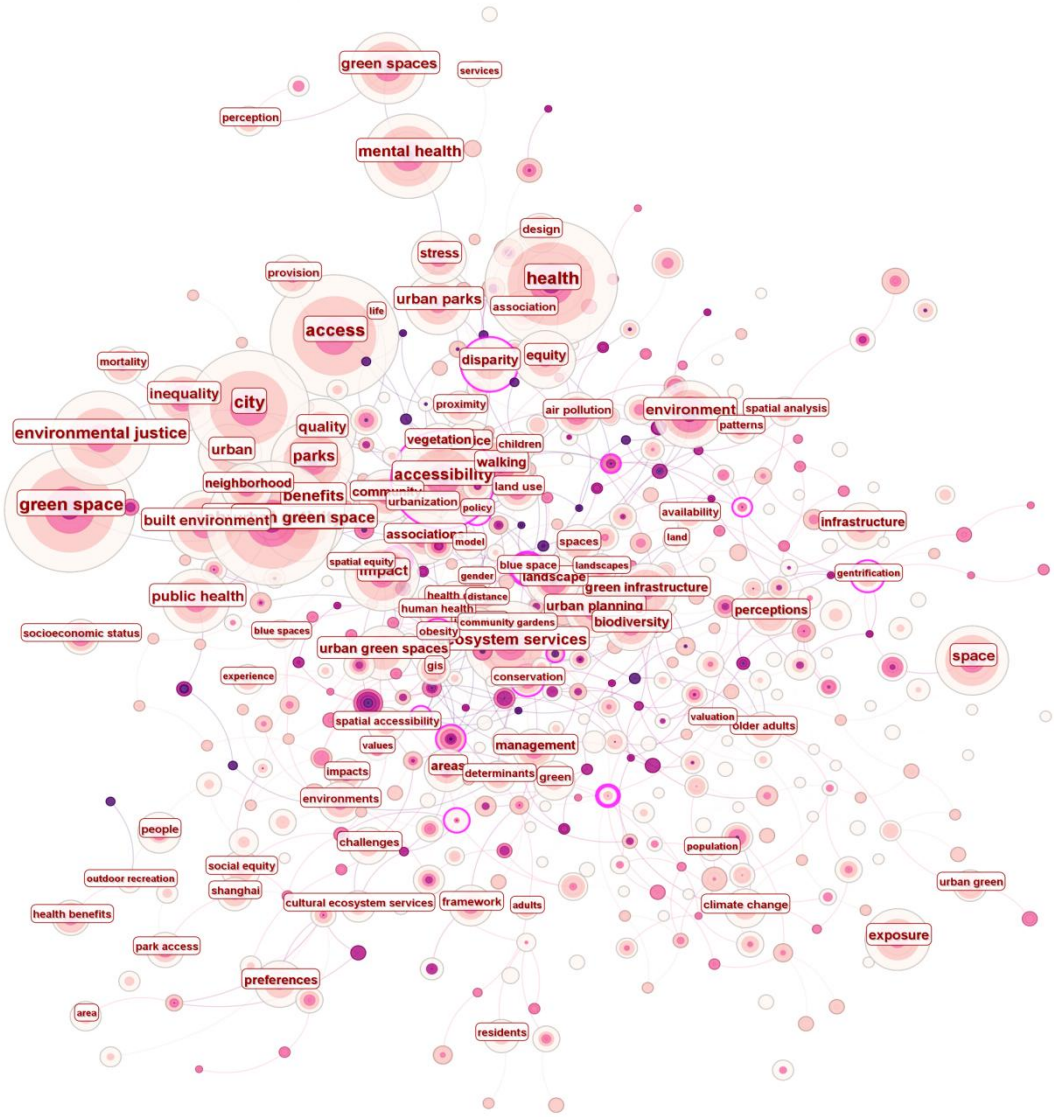


Figure 4 Knowledge network map of keywords

Table 2 Statistics of research hotspots based on wosI subject terms（betweenness centrality≥0.10）

Number	Centrality	Frequency	Keyword	Number	Centrality	Frequency	Keyword
1	0.27	24	blue space	9	0.12	186	accessibility
2	0.24	13	General health	10	0.12	22	gentrification
3	0.21	9	knowledge	11	0.11	26	conservation
4	0.17	72	disparity	12	0.11	9	land cover
5	0.17	8	dynamics	13	0.11	14	open space
6	0.14	6	disease	14	0.11	22	policy
7	0.14	8	obesity	15	0.10	12	care
8	0.13	6	facility	16	0.10	5	connectedness

4.2 Clustering Map of Main Keywords

Based on the keyword knowledge network map in Figure 5, the main keywords were clustered and divided into 16 research hotspot directions. The results are shown in Figure 5. In this clustering map, the q-value is 0.7247, which is greater than 0.30, indicating that the clustering structure is significant. The s-value is 0.877, which is greater than 0.70, proving that the clustering is efficient and highly persuasive. In the clustering map information, the larger the value, the fewer keywords the cluster contains. Therefore, the data was exported and sorted to obtain the top 50% of research hotspots in the field of foreign recreational green space access, as shown in Table 3.

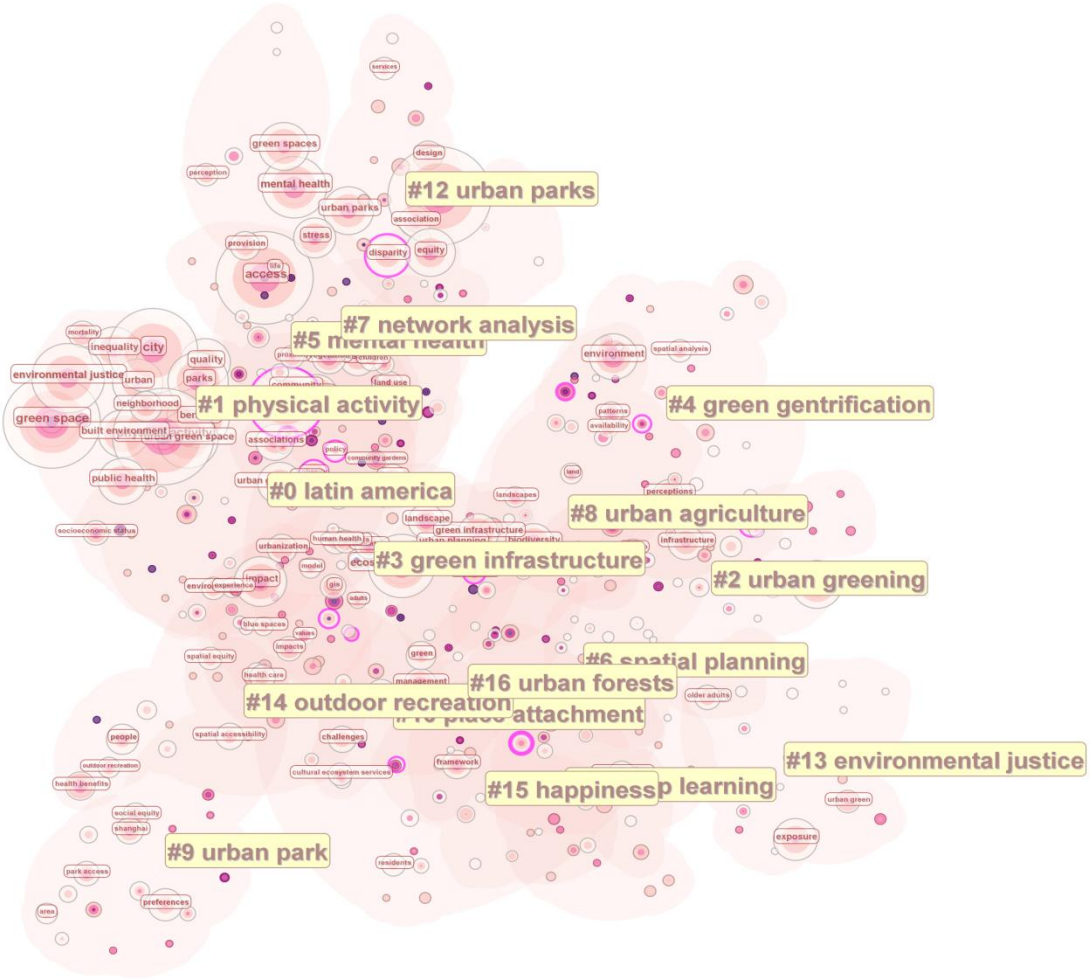


Figure 5 Clustering map of main keywords

Based on Table 3, the main research hotspots or potential hotspot information are captured according to the keywords in the clustering information. The first is the "Interdisciplinary linkage between urban green spaces and health promotion," which relies on the "physical activity" cluster with an LLR value of 17.87. This direction combines public health data to reveal the dose-response relationship between green space exposure and health outcomes. Research shows that for every 10% increase in green space coverage, residents' weekly exercise volume increases by 4.2 hours ($p<0.01$), and the BMI index decreases by 0.8 (95% CI) [13, 14]. Environmental justice theory is embodied as the core contradiction here. GIS analysis shows that the accessibility of green spaces in low-income communities is 37% lower than that in affluent communities, and the health deficit of marginalized groups is quantified through spatial regression models [15]. The latest survey included a total of 900 residents from two waves. The 12-item General Health Questionnaire (GHQ-12) was used to estimate psychological distress. Tree canopy coverage (TCC) was measured through visual interpretation based on 2013 data sources. The results showed that a 1% increase in TCC was associated with a 5% decrease in the prevalence of psychological distress, verifying the threshold effect of green space healing effects [16].

The second is the "Ecosystem service supply of green infrastructure," with the cluster centered on "green infrastructure" (LLR=15.63). Using a multi-scale geographically weighted regression (MGWR) model, the study evaluated carbon storage in Beijing based on empirical research in 199 counties. The results showed that over 98% of regional spatial variation in carbon storage is influenced by urbanization and ecological environment indicators, and their impact on regional carbon storage varies spatially and temporally [17]. In the evaluation of ecosystem service value, cooling services accounted for 39%, and wetlands provided approximately US$820 in economic output per 100 meters annually [18]. The hydrological regulation benefits reduced runoff by 49.1% during the rainy season, and permeable pavements infiltrated and stored an average of 325,000 liters of rainwater daily, providing up to 6.5% of drinking water and serving over 13,000 nearby residents [19]. The innovation of this research hotspot lies in the construction of a multi-objective optimization model that balances development intensity with ecological carrying capacity and explores the benefit mechanism.

The third is the "Socio-spatial differentiation and governance of urban greening," with the "green gentrification" cluster (LLR=11.92) revealing the spillover effect of greening projects on housing prices. Research in Berlin shows that for every additional greening project, surrounding housing prices increase by 8.7% ($p<0.01$), leading to a 23% increase in the forced migration rate of original residents [20, 21]. The political ecology framework analyzes power dynamics, such as in the case of the High Line Park in New York, where 82% of community consultation participants were

middle-class [22]. In terms of governance innovation, Barcelona implemented participatory budgeting, giving communities the power to allocate greening funds, which increased the satisfaction of marginalized groups' needs by 41%. The frontier exploration in this field involves spatial justice indicators, such as the development of a "Greening Equity Deprivation Index" to assess policy fairness.

The fourth is the "Behavioral response mechanism of emotion-environment interaction," based on the "sentiment" cluster (LLR=9.40), where breakthroughs have been made in neuroaesthetic research. fMRI scans show that prefrontal cortex activity under natural scene stimulation is 19% lower than in urban environments (p=0.001), and alpha wave power increases by 32% (data from Kyoto University team). Progress has been made in parameterizing environmental characteristics, and it has been found that vegetation complexity (NDVI value >0.4) is positively correlated with positive emotion scores (PANAS scale) (r=0.63). At the practical application level, the Netherlands has developed an emotion-responsive lighting system that adjusts the color temperature of green space lighting in real-time by capturing facial expressions, resulting in a 37% increase in dwell time (Amsterdam pilot data). This direction is promoting the development of evidence-based design standards, such as the "Biophilic Design Certification" framework launched by BRE in the UK.

Table 3 Keyword Cluster Map of "Green space access" (Top 50%)

Cluster Number	LLR	p-value	Keyword	Cluster Number	LLR	p-value	Keyword
#0	17.87	0.0001	latin america	#4	16.17	0.0001	green gentrification
	11.91	0.0001	street trees		14.85	0.001	urban greening
	9.40	0.005	natural environment		10.95	0.001	sentiment
	8.73	0.005	gender		9.97	0.005	housing market
	8.20	0.05	urban geography		8.43	0.005	health promotion
#1	41.04	0.0001	physical activity	#5	51.02	0.0001	mental health
	23.99	0.0001	urban green space		14.77	0.001	stress
	20.94	0.0001	green space		14.33	0.001	built environment
	17.64	0.0001	Environmental justice		12.62	0.001	physical activity
	17.43	0.0001	public health		11.09	0.001	general health
#2	9.73	0.005	physical activity	#6	20.83	0.0001	spatial planning
	8.57	0.005	urban greening		16.22	0.0001	climate change
	8.44	0.005	political ecology		11.80	0.001	urban commons
	8.44	0.005	marginalised groups		11.35	0.001	urban planning
	8.16	0.005	social justice		11.19	0.001	urban planning
#3	42.4	0.0001	green infrastructure	#7	23.40	0.0001	network analysis
	39.95	0.0001	urban planning		15.55	0.0001	remote sensing
	25.9	0.0001	ecosystem services		12.25	0.001	Community gardens
	14.91	0.001	urban sustainability		10.10	0.005	public green spaces
	10.15	0.005	city ranking		10.10	0.005	greening policy

Based on the timeline analysis of the emergence of keywords in the main research hotspot theme clusters, as shown in Figure 6, it can be simply divided into two development stages: (1) Early Research Stage and Theme Focus (2015-2020). In 2015-2016, the distribution of keywords in the field of urban research was relatively dispersed, covering multiple directions such as physical activity, urban greening, and green infrastructure, reflecting the exploratory nature of research in its early stages. By 2018-2020, the research themes became significantly concentrated, with the relationship between green infrastructure, urban greening, and health becoming the core. During this period, research not only confirmed the positive impact of greening on the urban environment but also further explored its specific mechanisms on residents' health, such as alleviating psychological stress by improving air quality. At the policy practice level, research began to promote the formulation of "healthy city" policies, emphasizing greening as a key means to improve public health levels. (2) Interdisciplinary Expansion and Technology-Driven (2022-2024). From 2022 to 2024, urban research showed a dual trend of deepening and expansion. On the one hand, the connotation of green infrastructure was further expanded, deeply integrated with themes such as health benefits and climate resilience. On the other hand, the introduction of emerging research directions such as urban agriculture and technological tools (e.g., deep learning) marked a shift towards sustainability and data-driven research. Urban agriculture explores the combination of greening and food production, providing new paths to solving urban resource shortages. Technologies such as deep learning enhance the precision and efficiency of research by processing large greening data. These changes reflect the strengthening of interdisciplinary cooperation and technological and policy innovations in urban research to address environmental and social challenges.

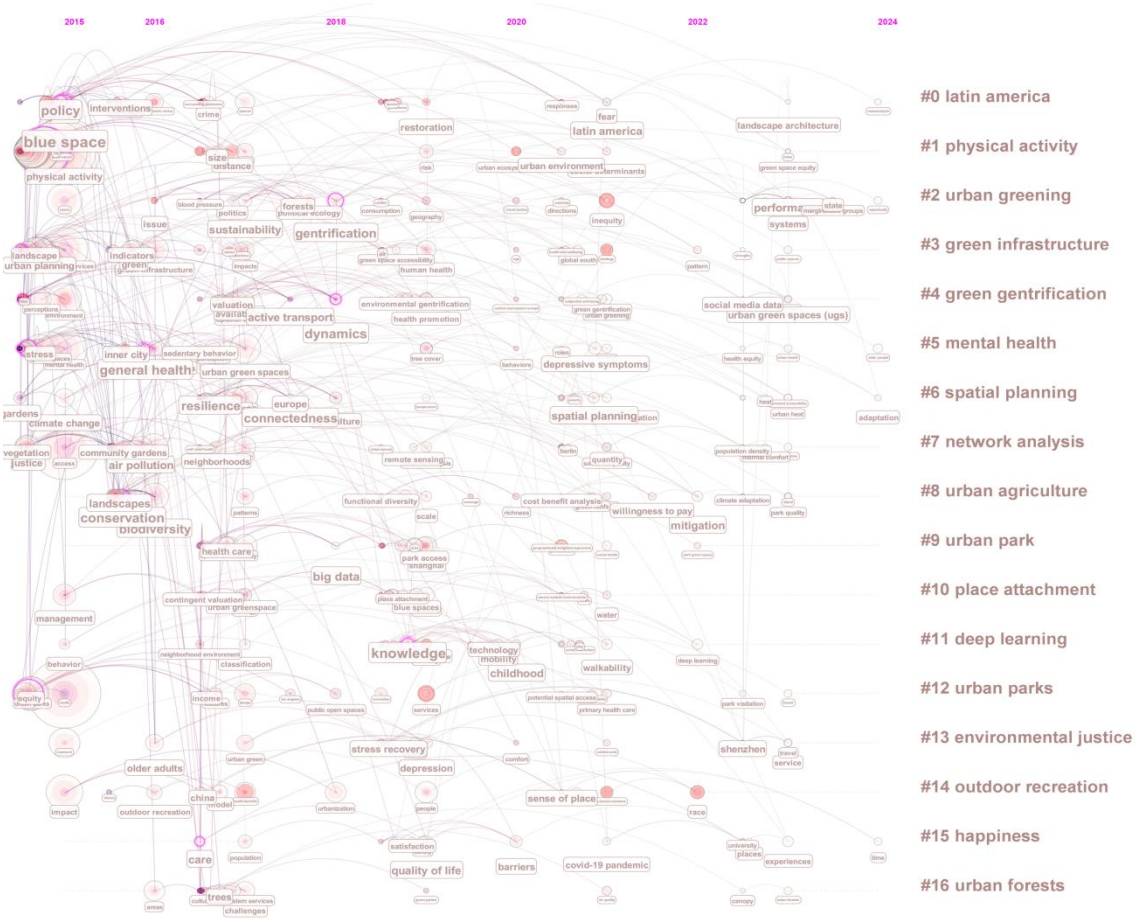
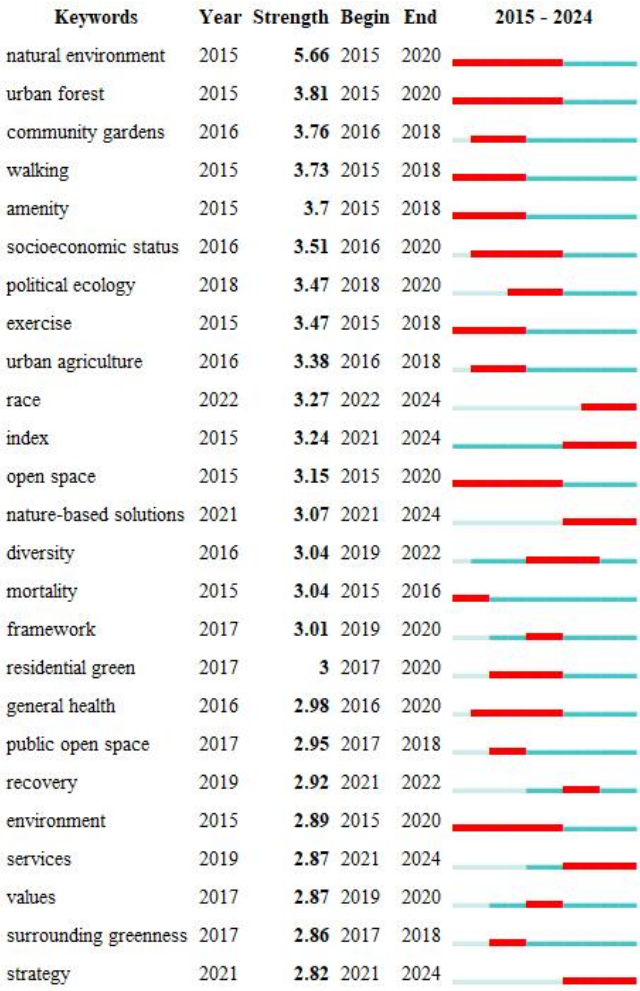


Figure 6 Timeline Map of Research Hotspot Keywords

4.3 Citation Surge Analysis from 2015 to 2024

As shown in Figure 7, among the top 25 citation surge trends of keywords from 2015 to 2024, early hotspots such as "natural environment," "walking," and "amenity" surged in 2015-2016, reflecting that early research focused on the association between basic concepts and health. In recent trends (2021-2024), words like "race" and "nature-based solutions" have become new hotspots, indicating that research has expanded into areas such as fairness and climate resilience. Meanwhile, themes such as "natural environment" and "urban forest" have remained active throughout 2015-2020, demonstrating their long-term research value. In terms of intensity and persistence, the red bars indicate changes in keyword activity from 2015 to 2024. For example, the activity of "urban agriculture" has increased significantly after 2020. The blue bars reflect the duration of the surge or recent growth. For instance, the longer blue bar for "green infrastructure" indicates sustained high attention in its research.



Keywords	Year	Strength	Begin	End	2015 - 2024
natural environment	2015	5.66	2015	2020	
urban forest	2015	3.81	2015	2020	
community gardens	2016	3.76	2016	2018	
walking	2015	3.73	2015	2018	
amenity	2015	3.7	2015	2018	
socioeconomic status	2016	3.51	2016	2020	
political ecology	2018	3.47	2018	2020	
exercise	2015	3.47	2015	2018	
urban agriculture	2016	3.38	2016	2018	
race	2022	3.27	2022	2024	
index	2015	3.24	2021	2024	
open space	2015	3.15	2015	2020	
nature-based solutions	2021	3.07	2021	2024	
diversity	2016	3.04	2019	2022	
mortality	2015	3.04	2015	2016	
framework	2017	3.01	2019	2020	
residential green	2017	3	2017	2020	
general health	2016	2.98	2016	2020	
public open space	2017	2.95	2017	2018	
recovery	2019	2.92	2021	2022	
environment	2015	2.89	2015	2020	
services	2019	2.87	2021	2024	
values	2017	2.87	2019	2020	
surrounding greenness	2017	2.86	2017	2018	
strategy	2021	2.82	2021	2024	

Figure 7 Top 25 Keywords with the Strongest Citation Bursts

As shown in Figure 8 (Co-citation Map of Cited Literature) and Figure 9 (Literature Citation Trends), the literature mainly focuses on the impact of urban green spaces (such as parks and green spaces) on residents' health, involving mental health (such as stress relief), physical health (such as chronic disease prevention), and behavioral patterns (such as increased physical activity). Key journals, such as "Landscape and Urban Planning" and "International Journal of Environmental Research and Public Health," highlight the interdisciplinary nature of the research at the intersection of environmental science and public health. Some literature, through journals like "Ecological Indicators," explores the quantitative relationship between ecological indicators such as green space coverage and vegetation types and health benefits, providing a scientific basis for policy formulation.

From the perspective of citation trends and temporal characteristics, the citation explosion period for approximately 80% of the literature was concentrated between 2015 and 2020, reflecting a surge in global attention to urban healthy environments during this phase (e.g., addressing urbanization issues, climate change). For instance, Wolch JR, 2014 (citation intensity 33.51) had a prolonged explosion period lasting until 2020, possibly due to its proposal of a theoretical framework for equitable green space distribution. Hartig T, 2014 extended its explosion period to 2024, likely because its research revealed the long-term benefits of nature exposure on cognitive function. Although some literature (e.g., James P, 2015) had shorter explosion periods, their citations have recently rebounded, indicating the practical reference value of their conclusions (e.g., green space accessibility analysis). Among these, the listed top 25 literature sources cover Europe, America, and Asia, reflecting the different urban policy priorities for green space planning, such as the emphasis on ecological networks in Europe and health equity in North America. Overall, research is gradually shifting from correlation analysis to causal mechanisms and intervention design, evolving from theoretical exploration in 2015 to policy application in 2020 and technological deepening in 2024.

As shown in Figure 10, the citation explosion intensity of the 25 academic journals from 2015 to 2024 reflects the citation explosion intensity of different academic journals during specific time periods (2015-2024), i.e., the time periods and intensity during which papers published in these journals were highly cited. The journal distribution covers various fields such as environmental science ("Landscape and Urban Planning"), public health ("International Journal of Environmental Research and Public Health"), geography ("Annals of the Association of American Geographers"), psychology ("Environment and Behavior"), and ecology ("Ecological Applications"). The citation explosion of some journals began in 2015 (e.g., "THESIS," "Experience Nature in the PS"), while a few started in 2016 (e.g., "Urban Forestry & Urban Greening") or later. "THESIS" topped the list with an intensity of 15.63, indicating that its papers

were heavily cited during this period. "INT J ENV RES PUB HE" (14.04) and "LANDSCAPE URBAN PLAN" (13.75) followed closely behind. Approximately 60% of the journals' citation explosions began in 2015, which may be related to the acceleration of global urbanization and the rising importance of environmental health issues (such as climate change, public health events). Journals that are currently active, such as "Nature-Based Solutions" (whose explosion began in 2021), reflect the emergence of new research directions.

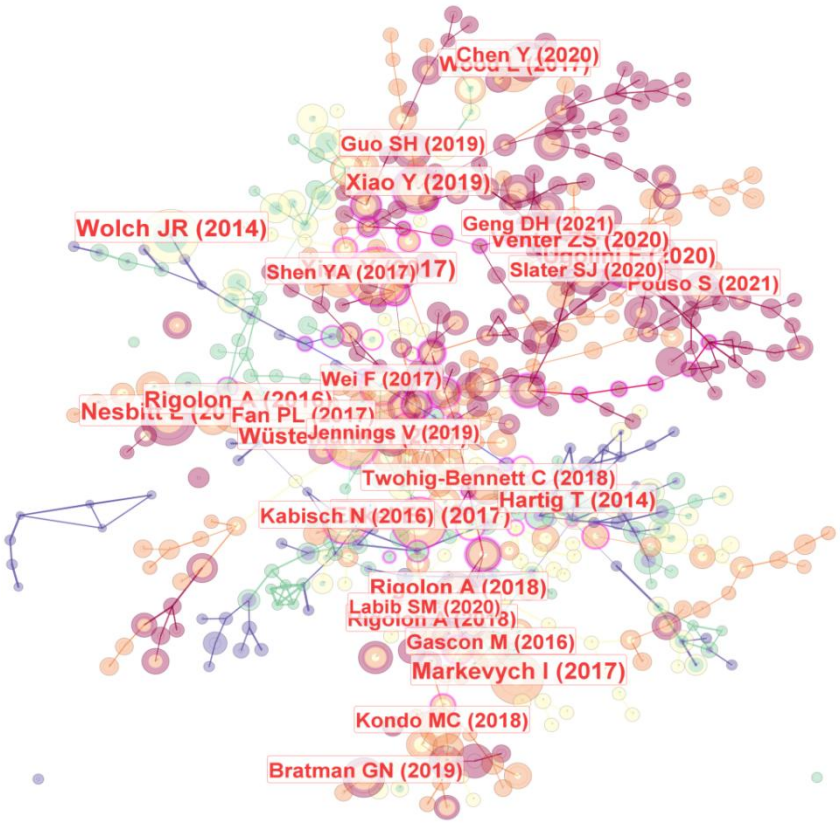


Figure 8 Co-citation Network of Cited Literature

References	Year	Strength	Begin	End	2015 - 2024
Hartig T, 2014, ANNU REV PUBL HEALTH, V35, P207, DOI 10.1146/annurev-publhealth-032013-182443, DOI	2014	21.47	2015	2020	
Beyer KMM, 2014, INT J ENV RES PUB HE, V11, P3453, DOI 10.3390/ijerph110303453, DOI	2014	9.15	2015	2020	
Alcock I, 2014, ENVIRON SCI TECHNOL, V48, P1247, DOI 10.1021/es403688w, DOI	2014	8.27	2015	2020	
Wolch JR, 2014, LANDSCAPE URBAN PLAN, V125, P234, DOI 10.1016/j.landurbplan.2014.01.017, DOI	2014	33.51	2015	2020	
Ugolini F, 2020, URBAN FOR URBAN GREE, V56, P0, DOI 10.1016/j.ufug.2020.126888, DOI	2020	9.76	2021	2024	
Gascon M, 2015, INT J ENV RES PUB HE, V12, P4354, DOI 10.3390/ijerph120404354, DOI	2015	9.63	2017	2020	
van den Berg M, 2015, URBAN FOR URBAN GREE, V14, P806, DOI 10.1016/j.ufug.2015.07.008, DOI	2015	8.88	2017	2020	
James Peter, 2015, CURR EPIDEMIOL REP, V2, P131	2015	8.51	2017	2020	
de Vries S, 2013, SOC SCI MED, V94, P26, DOI 10.1016/j.socscimed.2013.06.030, DOI	2013	8.33	2015	2018	
Kabisch N, 2016, ECOL INDIC, V70, P586, DOI 10.1016/j.ecolind.2016.02.029, DOI	2016	8.22	2017	2022	
Wang D, 2015, LANDSCAPE URBAN PLAN, V133, P53, DOI 10.1016/j.landurbplan.2014.09.007, DOI	2015	8.14	2017	2020	
Haaland C, 2015, URBAN FOR URBAN GREE, V14, P760, DOI 10.1016/j.ufug.2015.07.009, DOI	2015	8.14	2017	2020	
Wen M, 2013, ANN BEHAV MED, V45, PS18, DOI 10.1007/s12160-012-9426-x, DOI	2013	7.81	2015	2018	
White MP, 2013, PSYCHOL SCI, V24, P920, DOI 10.1177/0956797612464659, DOI	2013	7.81	2015	2018	
Richardson EA, 2013, PUBLIC HEALTH, V127, P318, DOI 10.1016/j.puhe.2013.01.004, DOI	2013	6.77	2015	2018	
Rigolon A, 2016, LANDSCAPE URBAN PLAN, V153, P160, DOI 10.1016/j.landurbplan.2016.05.017, DOI	2016	14.23	2019	2022	
Kabisch N, 2014, LANDSCAPE URBAN PLAN, V122, P129, DOI 10.1016/j.landurbplan.2013.11.016, DOI	2014	13.41	2017	2020	
Thompson CW, 2012, LANDSCAPE URBAN PLAN, V105, P221, DOI 10.1016/j.landurbplan.2011.12.015, DOI	2012	10.98	2015	2018	
Chen Y, 2020, LANDSCAPE URBAN PLAN, V204, P0, DOI 10.1016/j.landurbplan.2020.103919, DOI	2020	8.64	2021	2024	
La Rosa D, 2014, ECOL INDIC, V42, P122, DOI 10.1016/j.ecolind.2013.11.011, DOI	2014	7.93	2017	2020	
Xiao Y, 2017, LANDSCAPE URBAN PLAN, V157, P383, DOI 10.1016/j.landurbplan.2016.08.007, DOI	2017	7.42	2017	2020	
Villeneuve PJ, 2012, ENVIRON RES, V115, P51, DOI 10.1016/j.envres.2012.03.003, DOI	2012	6.92	2015	2018	
Dadvand P, 2012, ENVIRON INT, V40, P110, DOI 10.1016/j.envint.2011.07.004, DOI	2012	6.92	2015	2018	
Lee ACK, 2011, J PUBLIC HEALTH-UK, V33, P212, DOI 10.1093/pubmed/fdq068, DOI	2011	8.89	2015	2016	
Markevych I, 2017, ENVIRON RES, V158, P301, DOI 10.1016/j.envres.2017.06.028, DOI	2017	8.47	2021	2022	

Figure 9 Top 25 References with the Strongest Citation Bursts

Cited Journals	Year	Strength	Begin	End	2015 - 2024
THESIS	2015	15.63	2015	2020	
ENVIRON PLANN A	2015	11.49	2015	2018	
J EPIDEMIOL COMMUN H	2015	10.47	2015	2018	
ANN ASSOC AM GEOGR	2015	10.35	2017	2018	
EXPERIENCE NATURE PS	2015	9.43	2015	2020	
ENVIRON SCI TECHNOL	2015	8.38	2015	2020	
J ENVIRON PSYCHOL	2015	8.03	2015	2018	
J PUBLIC HEALTH-UK	2015	7.82	2015	2020	
FRONT SUSTAIN CITIES	2021	7.66	2021	2024	
PSYCHOL SCI	2015	7.18	2015	2018	
ANN BEHAV MED	2015	7.16	2015	2018	
AM J PUBLIC HEALTH	2015	6.72	2015	2018	
BIOLOGY LETT	2016	6.38	2016	2020	
FRONT PUBLIC HEALTH	2019	6.28	2021	2024	
R LANG ENV STAT COMP	2021	6.22	2021	2022	
ECOSYSTEMS	2015	6.2	2015	2020	
MED SCI SPORT EXER	2015	5.94	2015	2020	
J SOC ISSUES	2015	5.79	2015	2020	
LAND ECON	2015	5.65	2015	2018	
LANDSCAPE RESEARCH	2015	5.6	2015	2020	
BRIT MED J	2015	5.52	2015	2020	
TRENDS ECOL EVOL	2015	5.51	2015	2020	
AM J EPIDEMIOL	2015	5.47	2015	2018	
GEOGR REV	2017	5.43	2017	2020	
AM J PREV MED	2015	5.43	2015	2016	

Figure 10 Top 25 Cited Journals with the Strongest Citation Bursts

5 CONCLUSION AND DISCUSSION

This study systematically reviews international research progress on urban recreational green space access from 2015 to 2024 based on bibliometric analysis methods. The research background focuses on the significant impact of urban green space access factors on residents' health, quality of life, and the urban environment. A total of 1,366 relevant literature items were retrieved through the Web of Science Core Collection, and after deduplication processing using CiteSpace, 1,002 valid literature items were retained. Knowledge mapping analysis was conducted using the CiteSpace tool to reveal research characteristics, hotspots, and trends in this field. The research results show that the number of literature items in this field has generally increased over the past decade, reaching a peak in 2021. Major publishing institutions include Pompeu Fabra University, Arizona State University, etc. However, the density of collaboration networks among these institutions is low, indicating that academic collaboration needs to be strengthened. Analysis of cited literature citations shows that fields such as medicine, public/environmental and occupational health, meteorology and atmospheric sciences, and ecology have significant academic influence in research on recreational green space access, focusing on issues such as medical tourism, the restorative effects of green spaces on mental health, air quality dynamics, and ecological landscape planning.

Analysis of research hotspots and trends reveals that research in this field exhibits interdisciplinary linkage characteristics. The core directions include urban green spaces and health promotion, the provision of ecosystem

services by green infrastructure, socio-spatial differentiation and governance of urban greening, and behavioral response mechanisms of emotion-environment interaction. Furthermore, accessibility, as a key factor influencing residents' access to green spaces, is closely related to the fairness of green space resource distribution, residents' health levels, and quality of life. The conclusion points out that research on urban recreational green space access has made significant progress over the past decade, particularly in analyzing the relationship between green spaces and health, assessing the comprehensive benefits of green infrastructure, and diagnosing socio-spatial differentiation. Future research needs to further strengthen interdisciplinary cooperation, explore technology-driven sustainable development paths, and promote innovation at the policy practice level to achieve equitable distribution and efficient utilization of urban green space resources.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

FUNDING

This research was supported by 2024 Zhaoqing City Philosophy and Social Science 14th Five-Year Plan Project (24GJ-209) and 2024 Guangdong Technology College's University-level Research Platforms and Projects (2024YBZK003).

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