

Review

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Posted Date: 27 March 2026

doi: 10.20944/preprints202603.2268.v1

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Review

Psychological Restoration, Stress Relief and Visitor Well-Being: Lessons from Nature-Based Tourism for Urban Tourism Management (2005–2025)

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Abstract

Urban destinations increasingly incorporate green–blue infrastructure, sensory-balanced public spaces and microclimate-responsive design to mitigate visitor fatigue and support sustainable tourism experiences. To understand how insights from broader tourism environments, particularly nature-based contexts, can inform emerging urban well-being strategies, this study conducts a global bibliometric review (2005–2025) on psychological restoration, stress relief and visitor well-being. Using Scopus and a Boolean search combining mental-health constructs, tourism settings and analytical approaches, 825 records were identified and 149 articles were retained after applying eligibility criteria. Science-mapping and performance analyses reveal accelerated post-2018 growth and three dominant knowledge clusters centred on restoration pathways, environmental determinants and behavioural/hospitality components. Based on these patterns, the study introduces the RESTOR-URBAN model, integrating environmental moderators, psychological mechanisms and behavioural interactions that jointly shape stress reduction and emotional well-being across urban tourism systems. Results show increasing relevance of micro-restorative experiences, thermal-comfort management and stress-aware service design, while highlighting persistent methodological heterogeneity and limited integration of environmental co-data (UTCI, PET, DI). The findings demonstrate that restoration-based evidence from nature-based tourism can inform sustainable urban tourism planning, hospitality practice and visitor-experience design, and propose a research agenda emphasising standardised well-being indicators, longitudinal and SEM-based modelling, and environmental-quality variables for resilient, health-oriented urban destinations.

Keywords: urban tourism; visitor well-being; stress relief; psychological restoration; hospitality management; green-blue infrastructure; micro-restoration; urban sustainability; bibliometric analysis; science mapping

1. Introduction

Urban tourism has become a central component of contemporary urban development, generating both economic opportunities and significant challenges for cities worldwide. The multifaceted nature of these impacts on regional development has been documented in various contexts [15]. As urban destinations evolve, scholars and planners increasingly emphasize the need to enhance visitor well-being, manage environmental pressures, including detailed assessments of resource consumption in tourism infrastructure, such as hotels [2,3], and improve the live ability of public spaces. Parallel to this, a growing body of evidence demonstrates that exposure to green–blue

environments, whether natural or urban, supports psychological restoration, reduces stress, and improves emotional well-being [16,44,48]. These findings, initially rooted in nature-based tourism, are now directly informing debates on sustainable urban tourism, hospitality management, and the design of restorative urban environments [4,53].

In tourism research, restoration-based frameworks such as Attention Restoration Theory and Stress Recovery Theory have become foundational for understanding how environmental qualities shape attentional recovery, positive affect, and stress reduction [23,25,40]. Empirical studies identify mechanisms such as soft fascination, environmental compatibility, multisensory design, and perceived restorative environments as predictors of tourist satisfaction and emotional balance [8,21,34]. More recently, the role of “eco-emotions”, emotional responses linked to sustainable travel choices, has also been explored [41]. In urban settings, these pathways are increasingly relevant as cities implement green corridors, waterfront redevelopment, heritage districts, and pedestrian zones to counteract crowding, sensory overload, and urban fatigue [36,44,48]. Despite the growing interest, researchers note persistent conceptual heterogeneity, varying measurement standards, and inconsistent integration of environmental variables, such as heat stress, noise, and density, into tourism well-being models [7,31,37,42]. Efforts to standardize measurement, such as the validation of anxiety scales for tourism contexts [32], are still scarce and highlight the need for further development.

Scientometric analyses reveal accelerated growth after 2018 in publications linking tourism, well-being, environmental comfort, and psychological health, driven by cross-disciplinary collaboration across environmental sciences, psychology, and urban studies [27,51,55], as well as the rise of smart-tourism technologies [38]. This emerging convergence underscores that stress relief and restoration have become core themes not only in nature-based tourism but also in the strategic development of urban destinations seeking sustainable balance and resilience [5]. Yet gaps remain: the dominance of cross-sectional surveys, scarce use of physiological indicators, limited modelling of environmental moderators, and under-representation of cities in the Global South all constrain progress toward evidence-based urban-tourism policies [19,39,52].

Against this backdrop, a global bibliometric review (2005-2025) provides timely insight into the conceptual, methodological, and thematic foundations of tourism-related stress relief and emotional well-being. By mapping the evolution of knowledge, identifying thematic clusters, and synthesizing psychological, environmental, and behavioural mechanisms, this review clarifies pathways that are directly transferable to urban tourism and hospitality management, particularly in areas such as micro-restorative experience design (which may range from technological interventions to, conversely, the promotion of digital-free tourism [1]), green-blue planning, thermal-comfort strategies, and visitor-flow management [7,8,16,21,31,34,37,42,44,48]. These insights build on calls for more integrative, well-being-oriented urban tourism frameworks [4,53].

The aim of this study is therefore to synthesize global tourism well-being research through a bibliometric approach and to highlight the implications of these findings for urban tourism planning and hospitality management. In doing so, the review contributes to the development of sustainable visitor-experience models and supports the broader goal of designing emotionally supportive, environmentally sensitive, and socially resilient urban destinations. The conclusions emphasize the need for standardized well-being indicators, advanced modelling techniques, and stronger integration of environmental-quality variables as foundations for future urban-tourism research and practice [20,22,33].

2. Materials and Methods

2.1. Study Design

This study employed a global bibliometric review to analyse scientific production on stress relief, psychological restoration, and visitor well-being within tourism research (2005–2025), with particular emphasis on mechanisms relevant to urban tourism and hospitality management [27,33]. Bibliometric

reviews enable the systematic quantification of intellectual structures, thematic evolution, and conceptual linkages across large bodies of scientific literature, supporting evidence-based insights for emerging interdisciplinary fields such as tourism, urban planning, environmental psychology, and public health [16–19,22]. The methodological workflow followed internationally recognised scientometric protocols for performance analysis and science-mapping, ensuring replicability and transparency [39,48].

2.2. Data Source and Justification

Scopus was selected as the primary data source due to its wide disciplinary coverage, including tourism, psychology, environmental sciences, and urban studies, its high indexing quality, and its compatibility with bibliometric software such as VOSviewer and Bibliometrix [27,33,55]. Scopus's comprehensive metadata structure (authors, affiliations, keywords, citations, abstracts, references) is particularly suited for analysing cross-sector topics linking tourism, well-being, sustainability, and urban environments [16,22,48].

2.3. Search Strategy

The search query was designed to capture the intersection between tourism, mental-health constructs, environmental or urban exposure, and modelling approaches, following established practices in bibliometric reviews within tourism, environmental psychology, and urban well-being research [19,27,33,40].

The Boolean expression applied was:

(anxiety OR depression OR “mental well-being” OR stress OR “emotional well-being”) AND (“tourism” OR “urban tourism” OR “nature-based tourism”) AND (“restoration” OR “environmental quality” OR “structural equation modeling” OR model”).

This query formulation reflects core psychological outcomes (stress, anxiety, emotional well-being), environmental determinants (green–blue exposure, thermal comfort, microclimate), and structural-modelling approaches commonly applied in tourism and well-being studies [21,25,39]. The inclusion of “urban tourism” and environment-quality terms ensures that the dataset captures evidence transferable to urban contexts, where restoration, environmental comfort and visitor behaviour are increasingly relevant for sustainable tourism and hospitality management [7,10,48].

2.4. Inclusion and Exclusion Criteria

The initial search returned 825 documents. Inclusion criteria required publications to be peer-reviewed journal articles, written in English, published between 2005 and 2025, and indexed under Tourism, Urban Studies, Environmental Sciences, Psychology, Social Sciences, or closely related areas [27,33,55]. Articles were also required to contain an explicit conceptual or empirical link to tourism (urban or nature-based), stress, restoration, emotional well-being, environmental quality, or visitor experience, following established approaches in tourism-well-being and environmental-psychology research [8,9,48].

Exclusion criteria removed editorials, conference proceedings, book chapters, theses and commentaries, as well as documents lacking conceptual or empirical relevance for tourism, urban environments or well-being outcomes, in line with standard bibliometric protocols [40,51]. Studies unrelated to visitor well-being, environmental quality, stress pathways or tourism dynamics were also excluded to ensure thematic coherence [22]. Filtering and final corpus refinement were performed using Scopus's built-in analytical and refinement tools, following widespread scientometric procedures [42].

2.5. Final Corpus

After screening and filtering, 149 articles were retained. The final corpus represents a thematically coherent and methodologically diverse sample spanning tourism, urban planning,

psychology, environmental exposure, hospitality management, and sustainability. Similar corpus sizes and multidisciplinary patterns have been reported in recent high-impact bibliometric reviews examining well-being, environmental quality, and tourism dynamics [21,33], confirming that this dataset is sufficiently robust to support conceptual-structure analysis, thematic evolution modelling, and cross-sector interpretations relevant to urban tourism and restorative-environment research [27,42].

2.6. Data Extraction and Processing

Bibliographic metadata including authors, titles, abstracts, author keywords, index keywords, journal names, affiliations, citations, and references, were exported from Scopus in BibTeX and CSV formats for subsequent processing [33]. Data cleaning involved a multistep procedure following established scientometric protocols widely applied in tourism, urban studies, environmental psychology, and health-related bibliometrics [27,51]. Standardisation procedures included harmonising author names and institutional variants, merging duplicated keywords, unifying country names, and applying controlled vocabulary strategies such as singular/plural merging, synonym consolidation, and removal of non-semantic or overly broad terms [40].

Additional normalisation steps ensured semantic coherence between urban and nature-focused research, particularly for concept clusters related to restoration, stress, green-blue spaces, visitor behaviour, thermal comfort, microclimate, urban parks, and environmental quality [7,16]. This rigorous cleaning process enhanced the accuracy of co-occurrence analyses, thematic evolution mapping, and conceptual-structure outputs, ensuring the robustness required for cross-disciplinary insights in urban tourism and well-being research [42].

2.7. Software and Analytical Tools

Three complementary analytical tools were employed to examine the scientific structure of tourism, restoration and urban well-being research:

(1) *Bibliometrix/Biblioshiny (R-package)* was used to compute descriptive indicators including annual scientific growth, citation trends, productivity metrics, Lotka and Bradford distributions, thematic evolution and conceptual-structure mapping through MCA and factorial methods, following established practices in bibliometric tourism and environmental-psychology research [27,51].

(2) *VOSviewer 1.6.20* was used to generate keyword co-occurrence networks, visualise co-authorship patterns and construct density- and similarity-based clusters that reveal thematic proximity and disciplinary convergence across tourism, urban planning and environmental studies [51,55].

(3) *Scopus Analyze* supported the exploration of publication trajectories, national and institutional productivity, and subject-area distributions relevant to tourism, sustainability, urban environments and human well-being [33].

2.8. Performance Indicators

Performance analysis incorporated annual scientific output, identification of the most productive countries, leading journals and authors, citation distributions, collaboration patterns and the emergence of urban-relevant research themes such as urban heat stress (the modelling of which relies on complex meteorological reconstructions [58]), crowding, mobility friction and green-infrastructure planning [7,31,37]. These indicators are widely used in bibliometric tourism research and scientometric evaluations of urban environmental and well-being studies, as they provide insight into the maturity, interdisciplinary and structural evolution of the field [27,51]. Together, these metrics support an integrated understanding of how tourism, sustainability, environmental quality and psychological well-being converge in the scientific literature, informing the development of evidence-driven frameworks at the tourism-urban-well-being interface [22].

2.9. Science-Mapping Techniques

Science-mapping techniques were applied to characterise the intellectual and thematic structure of the field by integrating multiple visual-analytic procedures commonly used in tourism, environmental psychology and urban-well-being research [27,51]. Keyword co-occurrence networks were generated to identify thematic clusters related to stress, well-being, restoration, environmental quality, sustainability and urban experience [8,16]. Callon's centrality and density metrics were used to classify these clusters into motor, niche, emerging or declining themes, allowing for an assessment of the conceptual maturity and strategic relevance of each domain [27].

Overlay visualisation techniques enabled tracking the temporal evolution of topics—from early emphases on environmental stress and green-space exposure to more recent urban-well-being trends, digital-healing pathways and resilient tourism systems [4,33]. Multidimensional Scaling (MDS) was applied to examine proximities between psychological, environmental, urban-planning and hospitality constructs within the corpus, supporting the identification of latent conceptual relationships and interdisciplinary linkages that underpin contemporary research on restorative experiences in urban tourism [21,39].

2.10. Trend and Evolution Analyses

Longitudinal analyses conducted for the 2005–2025 period revealed clear thematic shifts within the corpus, including a transition from early emphases on environmental stress, psychological strain and exposure-based restoration toward more integrative approaches incorporating positive psychology, urban restoration and multisensory experience design [8,34]. Emerging topics reflected the rise of urban sustainability, thermal comfort, visitor density, mobility friction, smart-tourism technologies and green-blue infrastructure—concepts increasingly central to urban well-being and destination resilience [7,31,42].

In parallel, the analysis highlighted a growing role of stress-aware hospitality management, particularly in the post-COVID-19 period, where scholarly attention shifted toward emotional safety, visitor fatigue, psychosocial recovery and stress-responsive service environments [13,24,30,61].

2.11. Conceptual-Structure Analysis

Factor-analysis algorithms were applied to identify high-level conceptual domains within the corpus, revealing clusters that correspond to core thematic dimensions in tourism, environmental psychology and urban well-being research [27]. These clusters included: psychological stress pathways associated with restoration and affective recovery; environmental and green-blue determinants related to microclimate, environmental quality and exposure effects; urban-experience and hospitality-management factors influencing visitor satisfaction, comfort and emotional safety; sustainability and resilience frameworks emerging from climate-aware urban planning; and visitor-behaviour constructs tied to service quality, social interaction and multisensory experience design [36,44,48].

Together, these conceptual domains form an integrative structure that highlights the interplay between psychological, environmental, behavioural and service-oriented mechanisms, offering transferable insights for urban-tourism design, restorative-infrastructure planning and well-being-oriented hospitality management [4,53].

2.12. Ethical Considerations

As this study analysed secondary bibliographic metadata and did not involve any direct interaction with human or animal participants, no ethical approval was required [51]. All data collection and processing procedures adhered to Scopus terms of access for bibliographic content, as well as recognised guidelines for transparent reporting of scoping and bibliometric reviews, including PRISMA-ScR recommendations [40,51]. No confidential, identifiable or sensitive

information was accessed throughout the study, and all analytical scripts, settings and workflows can be shared upon request to ensure reproducibility and methodological transparency [27].

3. Results

The results of this bibliometric review are organized into thematic and structural components that reflect the scientific evolution of research on stress relief, psychological restoration, and well-being within tourism and urban environments. Overall, the analysis revealed a marked increase in publication activity over the 2005–2025 period, accompanied by the consolidation of interdisciplinary linkages between tourism studies, psychology, environmental sciences, urban planning, and hospitality management.

Science-mapping outputs, such as co-occurrence networks, factorial structures, and longitudinal trend visualisations, identified stable thematic cores related to restoration, environmental quality, tourist behaviour, and sustainability, alongside emerging themes that link positive psychology, micro-restorative experiences, thermal comfort, mobility, and smart-tourism technologies. Together, these findings provide a comprehensive overview of how the field has matured, diversified, and expanded toward urban-well-being applications.

3.1. Temporal Evolution of Scientific Production (2005–2025)

The temporal evolution of publication activity between 2005 and 2025 reveals three distinct phases in the development of research on stress relief, psychological restoration, and well-being within tourism and urban-environment contexts. The foundation phase (2005–2014) is characterised by low but sustained output, primarily addressing environmental stressors, landscape assessment, and early contributions from environmental psychology [25,40].

A transition phase (2015–2018) shows moderate growth, marked by the introduction of psychological constructs such as perceived restorative environments, nature connectedness, and affective recovery—concepts later adapted to urban green-blue infrastructure and city-tourism settings [16,44,48].

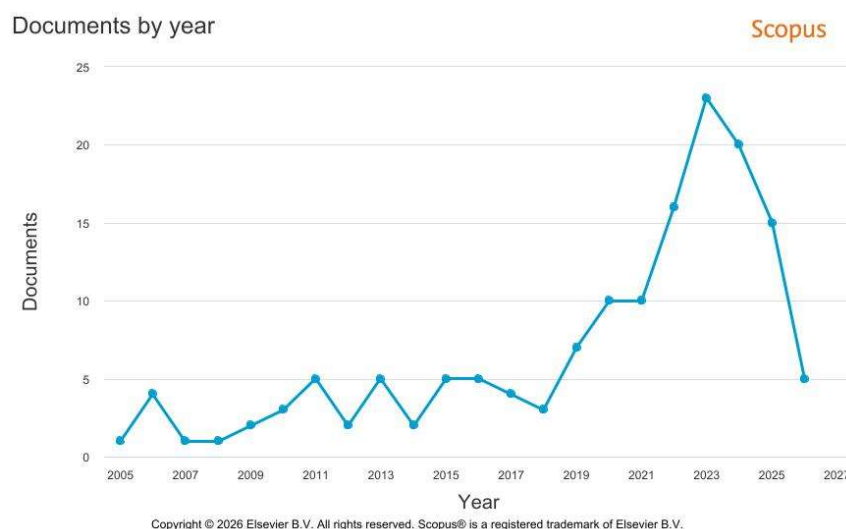


Figure 1. Annual scientific production on tourism, restoration, and urban well-being (2005–2025).

The figure displays publication trends indexed in Scopus during the 2005–2025 period, showing a marked increase after 2018 and a peak in 2023, followed by a stabilization in 2024–2025.

A rapid acceleration occurs after 2018, coinciding with growing global attention to mental health, urban live ability, and the restorative role of nature-based and hybrid (urban–natural) tourism

A third cluster in the lower-right quadrant contains environmental, climatic, and sustainability-oriented concepts, including climate change, environmental sustainability, environmental impact [59], biodiversity, and anthropogenic stress, a concern that extends to wildlife in tourist areas [6], highlighting the growing relevance of biophysical constraints in tourism studies [4,36].

Overall, the conceptual-structure map triangulates psychological, behavioural, and environmental mechanisms, confirming the thematic evolution observed across the 2005–2025 corpus [27,33].

3.3. Factorial Analysis: Clusters and Semantic Proximity

The cross-field analysis highlights how institutions, countries, and conceptual domains interact within the scientific landscape of tourism, restoration, and urban well-being research, revealing key geographic and thematic convergence patterns across the corpus.

The plot shows strong articulation between productive institutions and countries—China, the United States, Australia, and Spain—and dominant thematic fronts such as tourism, stress, mental health, and controlled study [33]. This distribution reflects the leadership of Chinese and U.S. institutions in SEM-based mental-health tourism research [19,39], the prominence of Australian groups in restoration and VR-enabled well-being studies [10,12], and the sustained contribution of European scholars to sustainability-oriented climate-comfort research [7,37,42].

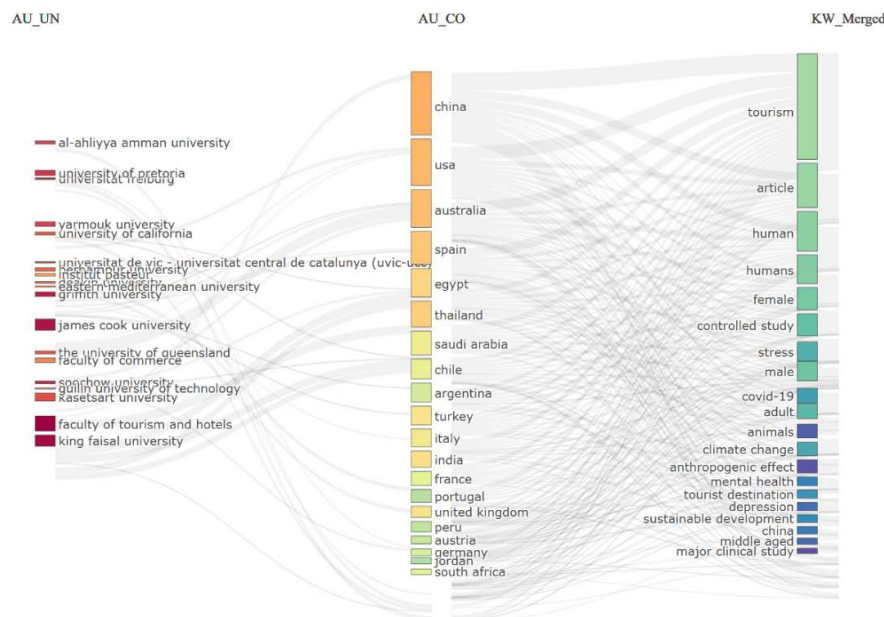


Figure 3. Three-field plot showing relationships among institutions, countries, and merged keywords in the corpus.

Cross-cutting keywords such as climate change, sustainable development, tourist destination, female, male, and adult indicate a multidisciplinary research network operating at the intersection of environmental psychology, destination management, and public health [4,22].

The conceptual-structure analysis also reveals three robust clusters:

(1) A psychological and psychophysiological stress cluster, combining constructs such as stress, physiological stress, anxiety, and depression, consistent with research on restorative environments,

VR-based emotional recovery, and pandemic-related stress dynamics, including its impact on hospitality workers [8,18,21,35,62].

(2) A tourist-behaviour and management cluster, linking tourist behaviour, tourism management, hospitality, and social interaction, consistent with studies on experience quality, interaction-related fatigue, and behavioural adaptation, including research on specific tourist populations such as international students [20,28–30].

(3) A sustainability and environmental-impact cluster, including environmental sustainability, environmental impact, climate change, thermal comfort and climate-adaptive tourism planning [4,7,31,42]. This cluster also encompasses studies on anthropogenic stress on biodiversity, affecting a range of species from mammals [6] and birds [63] to marine life [49].

The spatial proximity among questionnaire, controlled study, and structural equation modeling (SEM) reflects recent methodological consolidation in the field, with increasing use of SEM/PLS-SEM to test mediation and moderation structures [19,39].

Lastly, the three-field plot highlights emerging participation from Latin-American and Middle-Eastern institutions, including Chile, Argentina, Peru, and Saudi Arabia, contributing to biodiversity tourism, protected-area management [11,35,60], and thermal-stress studies.

3.4. Methodological Maturation and Diversification

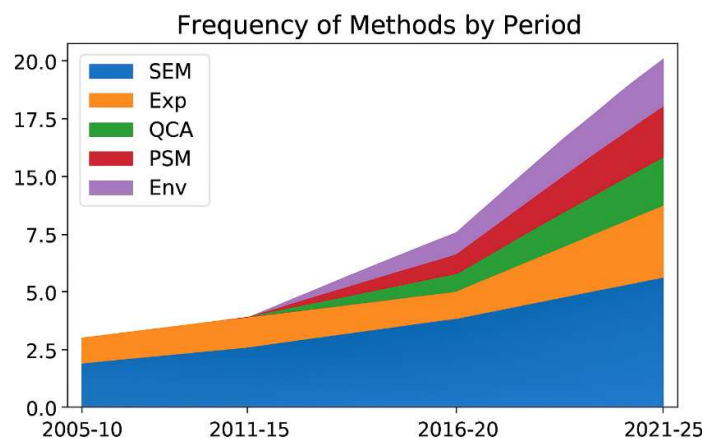


Figure 4. Frequency of methodological approaches across study periods (2005–2025).

The corpus exhibits a decisive shift from descriptive, cross-sectional approaches to causal modelling, hybrid designs, and quasi-experimental methodologies that support deeper examination of psychological, environmental, and behavioural mechanisms in tourism and urban-well-being research [19,39].

A key development is the dominance of SEM/PLS-SEM models, widely used to analyse mediation pathways such as restorative environments → place attachment → well-being and moderators including involvement, empathy, and travel anxiety [20,29,30].

Another major development is the rise of experimental and intervention-based designs, including VR tourism trials in long-term care facilities and web-based psychological-capital programs for tourism workers [10,50].

QCA (Qualitative Comparative Analysis) has also expanded the ability to identify multiple sufficient configurations for restorative outcomes in multisensory and heritage environments [14]. Furthermore, new research designs are emerging to study digital tourism experiences, such as the impact of tourism livestreaming [46]. Propensity Score Matching techniques have been applied.

Propensity Score Matching techniques have been applied to examine stress reductions following behavioural or policy interventions, particularly in pandemic-related contexts [18,52].

Mixed-method approaches integrating interviews, surveys, observational data and stress-coping frameworks have expanded the study of emotional recovery, socio-affective dynamics, and visitor adaptation in tourism and hospitality settings [20,30].

Finally, bio meteorological modelling using UTCI, PET and DI has introduced environmental moderators, thermal comfort, microclimate variability, heat-stress exposure deeply shaping sensory quality and affecting tourist behaviour in urban contexts [7,31,42]. The exploration of cutting-edge digital environments, such as the metaverse, also represents a new frontier in understanding tourist experiences and anxieties [64].

thermal comfort, microclimate variability, heat-stress exposure deeply shaping sensory quality and affecting tourist behaviour in urban contexts [7,31,42].

Altogether, these methodological trends indicate a shift toward greater causal precision and integrative frameworks combining psychological, environmental, and behavioural data.

3.5. Conceptual Model Proposal: RESTOR-URBAN (Restorative Exposure & Stress-Transformation in Urban Tourism Systems)

The RESTOR-URBAN model synthesizes the psychological, environmental, behavioural, and contextual mechanisms through which urban and hybrid urban–natural tourism experiences contribute to stress reduction and emotional well-being. Built upon insights from the bibliometric corpus, the model reframes restorative exposure beyond traditional nature-based tourism by integrating urban microclimate, sensory quality (noise, crowding, thermal comfort), green–blue infrastructure, and anthropogenic load as central determinants of visitor well-being [7,31,42,48].

Operationalizing the notion of a restorative dose, the model conceptualizes exposure as a function of frequency, duration, and sensory quality, incorporating green-blue attributes, biodiversity cues, and microclimatic comfort, as well as inclusive modalities such as VR-mediated access for mobility-limited populations [8,10,12,34]. Evidence shows that multisensory heritage environments enhance psychological restoration through the pathway Perceived Restorative Environment → Place Attachment [21,34], that VR-tourism enables well-being gains through presence → flow mechanisms [10,12,14], and that family-tourism consumption can reduce stress, anxiety, and depression in post-pandemic contexts [18]. Collectively, these studies demonstrate that high-quality micro-doses, short, repeated restorative exposures, are more effective than long exposures in low-quality environments where thermal discomfort or crowding fatigue may occur [7,29].

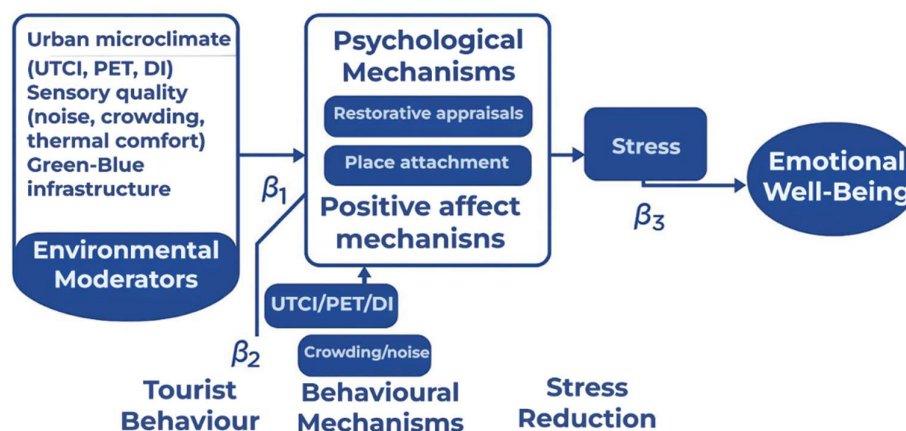


Figure 5. The RESTOR-URBAN Conceptual Model: Environmental, Psychological, Behavioural and Stress-Transformation Pathways in Urban Tourism Systems.

In line with the graphical model, RESTOR-URBAN positions Psychological Mechanisms as the core mediators through which exposure translates into lower perceived stress and enhanced emotional well-being. These mechanisms include restorative appraisals, place attachment, presence & flow, positive affect, and connectedness, all represented as internal components of the psychological block [8,21,34].

These cognitive–affective processes are further reinforced by Behavioural Mechanisms, including light physical activity, positive micro-interactions, and episodic memory, which together help consolidate restorative outcomes during urban-tourism experiences [20,29,30].

The Environmental Moderators, specifically UTCI/PET/DI (thermal-comfort indices), crowding, and noise, interact with psychological and behavioural pathways through the moderation paths shown in the diagram. Evidence highlights rising frequencies of heat-stress days in coastal destinations, pronounced afternoon discomfort in Mediterranean heritage cities, and elevated stress-frequency patterns in coastal versus inland tourist settings [7,31,37]. These findings imply that destinations should adopt UTCI-aware scheduling, implement microclimate-responsive design (shade structures, water features, breeze corridors), and apply visitor-load micro-zoning to maintain sensory quality and safeguard restorative mechanisms [42,48].

RESTOR-URBAN also reinforces the transition from isolated tourism exposures to destination-level restorative portfolios, combining in-situ micro-restorative experiences, VR-based inclusive access, and policy levers such as safety messaging, controllability cues, and family-travel incentives [12,18]. Research demonstrates that multisensory design, psychosocial support frameworks, and smart-tourism technologies enhance emotional recovery, satisfaction, and revisit intentions [10,20].

As an applied agenda, the model recommends piloting multi-component restorative interventions that integrate VR spaces in visitor centres, thermal-comfort adaptive scheduling, crowd-load management strategies, and evaluation frameworks combining SEM/MLM with EMA/HRV, methodologies increasingly adopted in tourism and environmental-psychology research [39,52]. Replication efforts should prioritise interventions that consistently demonstrate improvements in stress reduction, emotional well-being, and destination-experience quality, aligning with calls for more comprehensive perspectives on tourism sustainability and resilience [54].

3.5.1. Strategic Lessons from the RESTOR-URBAN Model for Urban Tourism Management (2005–2025)

Findings from climate-comfort, environmental-quality, and restoration-oriented tourism studies highlight the critical role of biophysical and sensory conditions in shaping visitor well-being [7,31,42,48]. Accordingly, RESTOR-URBAN provides several actionable directions for public agencies:

A. *Public-Sector Strategies: Urban Policy, Mobility and Environmental Governance*

- Implement shade networks, evaporative cooling zones, water features, and breeze corridors, supporting climate-adaptive urban design [7,31,42].
- Adopt UTCI-aware scheduling for events, attractions, and route planning, aligning tourism operations with thermal-stress variations [37,42].
- Apply heat-stress mapping in heritage districts and waterfront areas to prioritize interventions in high-vulnerability zones [7,31].
- Expand green–blue corridors along major tourism routes to enhance sensory quality and restorative exposure [16,44,48].
- Develop micro-parks, shaded plazas, cultural gardens, and walkable riverbank access points to strengthen restorative accessibility [48].
- Integrate environmental co-data (vegetation indices, thermal comfort, noise levels) into urban planning frameworks [31,44].
- Use temporal dispersion policies (off-peak incentives) and micro-zoning to mitigate overcrowding and sensory overload in tourism hotspots [29,45].

- Deploy real-time smart-tourism dashboards that visualize heat, noise, crowding, and mobility stressors [4,53].
 - Recognize tourism as a public-health asset by coordinating wellness tourism and urban liveability agendas [20,22].
 - Promote inclusive restorative access, including VR for individuals with mobility constraints [10,12].
 - Develop “Restorative City” accreditation frameworks to formalize well-being and environmental-comfort benchmarks [4,53].
- B. *Private-Sector Strategies: Hospitality, Attractions and Experience Design*
- Optimize soundscapes, scent, greenery, and ambient lighting to enhance multisensory comfort and affective recovery [45,56].
 - Reduce sensory clutter and procedural friction across touchpoints to minimise cognitive fatigue and improve experience quality [29,30].
 - Train staff in calm-inducing and empathetic communication, strengthening micro-interaction quality [20,30].
 - Introduce “slow-hospitality” formats that pace experiences to reduce emotional overload and stress [24,61].
 - Incorporate VR calm rooms in hotels and airports to support presence and flow for stressed or mobility-limited visitors [10,12].
 - Use VR immersion for heritage interpretation and blue-space simulation to enhance restorative engagement [12,14].
 - Provide VR-supported micro-restorative breaks within tours to mitigate fatigue in dense urban contexts [10].
 - Offer micro-walks of 10–20 minutes, supported by shaded, sensory-balanced environments [8,34].
 - Curate mini-experiences in museums, cafés, and attractions that stimulate positive affect and brief restorative exposure [45,56].
 - Embed well-being breaks into standard itineraries, aligning with evidence on micro-doses of restorative exposure [8,34].
- C. *Community-Level Strategies: Place Identity, Engagement, and Co-Creation*
- Designing quiet routes, shaded alleys, vernacular gardens, and micro-refuges, guided by local knowledge of comfort and sensory hotspots [16,44].
 - Co-managing sensory spaces in dense districts (e.g., pocket parks, shaded sitting areas) to enhance visitor comfort [48].
 - Leading local storytelling initiatives that strengthen place attachment and emotional connectedness [21,34].
 - Developing heritage interpretation and memory-based experiential routes aligned with community identity [20,35].
 - Curating identity-anchored routes (markets, craft districts, waterfronts) to enhance social belonging and reduce visitor fatigue [45].
 - Recommending alternative or off-peak routes to support sustainable visitor dispersion [29].
 - Feeding community observations—noise, thermal discomfort, crowding density, air quality—into smart-tourism systems [7,31].
 - Providing real-time alerts on peak-stress zones, supporting adaptive public-space governance [42,53].

4. Discussion

4.1. Integrating a Rapidly Maturing Field: Psychological, Environmental and Behavioural Pathways

This review demonstrates that tourism-well-being research has evolved into a consolidated interdisciplinary domain, increasingly integrating environmental psychology, urban studies, public health, and hospitality research [8,21,33]. The rapid post-2018 expansion reflects a shift from nature-centric frameworks toward urban restorative environments, where psychological, environmental, and behavioural pathways operate simultaneously. Rather than functioning as isolated constructs, these pathways form an interconnected system that helps explain why certain urban environments, heritage districts, green–blue corridors, multisensory plazas, produce measurable improvements in emotional regulation.

Three complementary mechanisms emerge:

First, psychological pathways, restorative appraisals, place attachment, presence–flow states, and positive affect, are now documented not only in forests and protected areas but increasingly within urban green–blue micro-spaces such as riversides, shaded pedestrian boulevards, and waterfront parks [21,34,48]. These findings align with environmental-psychology theories that propose attentional recovery and stress reduction can be achieved through perceptual soft fascination, even in built environments [25,40]. Even in built environments, drawing on foundational ideas such as the biophilia hypothesis [25,40,57]

Second, environmental determinants such as green–blue quality, biodiversity cues, shade availability, microclimatic comfort, and wind corridors consistently shape emotional outcomes in urban public spaces [7,31,42], consistently shape emotional outcomes in urban public spaces [7,31,42]. For instance, air pollution has been shown to negatively influence tourists' behavioral intentions [59]. The growing integration of UTCI/PET/DI metrics underscores that thermal comfort is not merely a physical condition but a psychological moderator influencing attentional load and stress recovery.

Third, behavioural and social pathways, walking, exploration, social interaction, and episodic memory, play a larger role in dense urban areas than in natural settings, due to cultural richness and social vibrancy [20,29]. These behaviours amplify restorative benefits by activating affective and embodied mechanisms that complement purely perceptual forms of restoration.

Together, these mechanisms support the idea that urban spaces can partially replicate, complement, or even enhance nature-based restorative processes when designed with sensory balance, microclimatic comfort, and mobility ease in mind.

4.2. Post-2019: Mental Health and Tourism as a Strategic Partnership

The prominence of mental-health-related research after 2019 mirrors the global acceleration of anxiety, depression, fatigue, and COVID-related stress [18,20], and family-based tourism contributed to psychological recovery following pandemic restrictions [18], although the mental health challenges for specific groups, such as hospitality workers, have also been documented [20,62]. Urban tourism emerged as a strategic partner for public health by offering short-cycle restorative opportunities accessible to local and regional populations. Evidence indicates that policy relaxations, increased domestic mobility, and family-based tourism contributed to psychological recovery following pandemic restrictions [18].

Technological innovations expand this restorative potential. VR-enhanced urban tourism, immersive cultural experiences, and digital nature simulations have shown strong effects on presence, flow, and emotional comfort among mobility-limited populations, long-term care residents, and stressed urban dwellers [10,12]. These digital-restoration pathways complement physical green–blue elements and offer inclusive alternatives in highly dense or socio-economically constrained environments [14].

4.3. From Correlation to Modeled Explanations: SEM and the Quest for Causal Structure

The review reveals a decisive methodological shift toward SEM/PLS-SEM, multivariate mediation, and moderated-mediation modelling [19,39]. These approaches allow testing causal chains, such as restorative environment → place attachment → well-being, within urban contexts such as waterfronts, pedestrian zones, multisensory plazas, and heritage clusters [21,34].

Importantly, SEM-based studies increasingly integrate environmental-quality variables, including noise exposure, thermal comfort indices (UTCI, PET, DI), and air-quality data, providing stronger causal explanations for stress-recovery processes in cities [7,31,42], including noise exposure, thermal comfort indices (UTCI, PET, DI) [58], and air-quality data. This integration confirms that urban microclimate and sensory conditions fundamentally shape psychological mechanisms, a key premise of the RESTOR-URBAN model.

4.4. Dose Matters: Toward Evidence-Based Tourism Prescriptions

Across multiple studies, restorative “micro-doses” short (10–20 minutes), frequent exposure to green–blue cues, shaded routes, breeze corridors, or multisensory urban plazas, produce meaningful reductions in stress and improvements in well-being [8,34]. These findings support designing itineraries and urban experiences that emphasize repetition over duration, particularly in cities facing mobility barriers, density stress, or thermal extremes [7,29].

The RESTOR-URBAN framework reinforces this logic by conceptualizing exposure as a function of frequency × duration × sensory quality, suggesting that even small restorative interventions embedded in daily or touristic mobility can accumulate into measurable emotional benefits.

4.5. The Blue Dimension: Integrating Waterscapes into Destination Design

Blue spaces consistently appear as strong predictors of emotional uplift, attentional restoration, and physical activation [16,48]. Within cities, rivers, canals, lakesides, wetlands, and coastal promenades act as restorative corridors that stimulate walking, reduce mental fatigue, and create perceptual refuge from sensory overload [17,48].

Urban-design interventions that improve accessibility, shade, seating, wayfinding, and multisensory coherence in blue-green areas align with public-health strategies aimed at population-level well-being [44]. These findings justify the integration of hydrological and ecological planning into sustainable tourism and mobility systems.

4.6. Geography of Knowledge: Concentration and Bridge Roles

The geographic patterns observed dominance of China, the USA, Spain, Australia, and the UK reflect strong institutional investment in environmental quality, thermal comfort, and sustainable urban tourism [7,37,42]. Emerging contributions from Latin America and the Middle East correspond to biodiversity tourism, protected-area management, and climate-stress environments, expanding the global epistemic landscape [11,35,60].

These geographic dynamics underscore the need for cross-regional collaborations capable of comparing microclimate conditions, crowding patterns, socio-cultural dynamics, and urban-public-space inequalities—factors that influence restorative affordances across the Global South. Furthermore, the geographic expansion of research is accompanied by a thematic diversification, with studies examining the impacts of tourism on biodiversity in various contexts, from primates [6] and birds [63] to marine life [49], highlighting the global relevance of anthropogenic stress.

4.7. Measurement Gaps: From Self-Report to Mixed Outcomes

Despite methodological advances, important gaps persist:

- Overreliance on self-reported surveys without integration of urban-sensor data (noise, pedestrian density, UTCI).

- Limited use of biomarkers such as HRV and cortisol, despite demonstrated feasibility in tourism and health research [21,22].
- Scarcity of EMA (Ecological Momentary Assessment) or real-time measures in urban micro-restorative settings.
- Insufficient modelling of environmental moderators, urban heat, crowding, air quality, walkability, that are central to urban well-being [7,31].

These limitations constrain causal traceability and reduce the replicability of urban-restoration findings.

4.8. Managerial and Policy Implications: Urban Tourism as Public-Health Infrastructure

This review positions urban tourism as a complementary public-health asset, capable of supporting stress relief and psychological restoration through frequent, accessible micro-experiences [20,26]. Urban planners and hospitality managers can co-design restorative corridors, VR-enhanced heritage routes, shaded walkways, blue-green nodes, and smart-tourism systems communicating real-time thermal comfort or crowding. These interventions align with sustainability goals and resilience agendas [4,53]. These interventions align with sustainability goals and resilience agendas [4,53,54].

4.9. Strengths and Limitations

Strengths include the integration of urban well-being constructs, environmental determinants, SEM-based causal analysis, and conceptual-structure mapping, providing a multidisciplinary and methodologically robust overview [27]. However, reliance on a single database (Scopus) may underrepresent context-specific urban studies, and metadata frequently omit detailed environmental variables such as noise, pollution, and intra-urban thermal heterogeneity [42]. These constraints are consistent with known limitations in bibliometric analyses, partially mitigated by rigorous keyword standardisation and environmental-terminology harmonisation [40].

4.10. Research Agenda: Toward Rigorous, Scalable and Comparable Urban Evidence

The proposed agenda focuses on strengthening methodological and conceptual integration:

1. Develop core outcome sets combining psychological (stress, affect, presence/flow) and environmental indicators (UTCI, noise, NDVI, blue-index).
2. Advance longitudinal SEM/MLM models evaluating microclimate, mobility, density, and sensory quality as moderators of restorative outcomes [39,52].
3. Integrate wearable biomarkers (HRV, cortisol) and urban sensors for real-time monitoring.
4. Expand cross-cultural and Global South studies, including research on specific tourist populations and their coping strategies [28], to reflect biophysical and socio-cultural variability.
5. Embed green-blue planning and microclimate adaptation into mainstream destination management and public-health strategies [31,44].

By grounding urban-tourism research in multi-scalar environmental data, causal-pathway modelling, and cross-disciplinary collaboration, the field can increasingly support evidence-based, well-being-oriented urban destinations

5. Conclusions

This global bibliometric assessment (2005–2025) shows that research linking tourism with stress reduction, psychological restoration, and visitor well-being has evolved into a mature, methodologically diversified, and increasingly urban-focused field. The sharp acceleration after 2018 reflects not only a post-pandemic emphasis on mental-health needs but also the consolidation of interdisciplinary work across environmental psychology, tourism studies, urban planning, and public-health research. This convergence is marked by the integration of environmental-quality

metrics, microclimate data, and advanced analytical techniques such as SEM/PLS-SEM, signalling a shift from descriptive correlations toward causal pathway modelling.

Across two decades of evidence, three mutually reinforcing mechanisms consistently underpin tourism-related stress-relief outcomes: psychological pathways, involving restoration-based appraisals, affective processes, presence–flow dynamics, and place attachment; environmental pathways, shaped by the “dose” and quality of green–blue exposure, microclimate conditions, and sensory affordances; and behavioural pathways, which incorporate light physical activity, exploration, and episodic memory formation within tourism encounters. Recent studies demonstrate that these mechanisms, traditionally examined in nature-based settings, increasingly operate within urban environments, where micro-restorative opportunities, such as riverfronts, shaded pedestrian corridors, blue-green edges, and multisensory heritage districts, play a central role in mitigating stress and enhancing emotional well-being.

These patterns suggest that restorative urban tourism holds significant potential as an accessible, low-cost public-health intervention, particularly when destinations are designed to prioritise high-quality, short, and frequent micro-exposures rather than relying solely on prolonged or singular encounters. This orientation reframes cities not only as centres of mobility and cultural interaction, but also as restorative ecosystems capable of supporting emotional regulation and socio-ecological resilience. The implications extend directly to urban planning and hospitality management, reinforcing the strategic value of green–blue infrastructure, microclimate-sensitive design, sensory-balanced public spaces, and multisensory experience curation.

At the same time, persistent methodological limitations constrain cross-study comparability. These include heavy reliance on self-reported measures, limited integration of physiological biomarkers (e.g., HRV, cortisol), scarce use of longitudinal or implementation-trial designs, and insufficient incorporation of environmental moderators, such as thermal comfort, anthropogenic load, air quality, and walkability, into analytical models. Addressing these constraints will require the development of core outcome sets, the integration of wearable and environmental sensors, and the adoption of longitudinal SEM/MLM frameworks capable of modelling complex mediations and moderations over time.

Based on these insights, the review proposes a forward-looking research and management agenda:

- (1) employ standardised psychological and environmental well-being indicators with pre–post evaluation cycles;
- (2) design and test dosage-based interventions in urban green–blue spaces;
- (3) incorporate environmental variables such as NDVI, blue-index, noise, temperature, and pedestrian density directly into modelling frameworks;
- (4) expand geographical representativeness toward under-studied regions in the Global South; and
- (5) embed green–blue infrastructure and restorative-tourism principles into mainstream destination planning, mobility systems, and public-health strategies.

In sum, the evidence demonstrates that structured, frequent contact with restorative environments, whether natural, urban, or digitally mediated, effectively reduces stress and enhances emotional well-being. As cities confront intensifying environmental pressures, climate variability, and mental-health demands, restorative urban tourism emerges as a vital well-being infrastructure, offering scalable and sustainable pathways to improve the quality of life for residents and visitors while contributing to broader goals of urban resilience and planetary health.

Supplementary Materials: The following supporting information can be downloaded at: <https://drive.google.com/drive/folders/1IoRGIFdNb-k735-9waRBljLJysVutg5j?usp=sharing>, Figure 1,2,3,4,5: Scopus data base.

Author Contributions: Conceptualization, M.A.A.Z. and D.S.C.M.; methodology, M.A.A.Z.; software, M.A.A.Z.; validation, M.A.A.Z., D.S.C.M. and M.G.S.R.; formal analysis, M.A.A.Z.; investigation, M.A.A.Z.,

M.P.C.I., D.K.V.M. and M.A.S.F.; resources, M.A.A.Z.; data curation, M.A.A.Z., M.P.C.I. and D.K.V.M.; writing, original draft preparation, M.A.A.Z.; writing, review and editing, M.A.A.Z., D.S.C.M., M.G.S.R., M.P.C.I., D.K.V.M. and M.A.S.F.; visualization, M.A.A.Z.; supervision, D.S.C.M. and M.G.S.R.; project administration, M.A.A.Z..

Funding: This research received no external funding.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: Generative Artificial Intelligence (GenAI) was used only for drafting, reorganising, and editing text, following author-provided content and instructions. GenAI did not generate data, conduct analyses, extract metadata, or make methodological decisions. All analyses, search strategies, scripts, and interpretations were performed manually by the authors.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

APC	Article Processing Charge
BGI	Blue-Green Infrastructure
DI	Discomfort Index
EMA	Ecological Momentary Assessment
GDPR	General Data Protection Regulation
HRV	Heart Rate Variability
IOAP	Institutional Open Access Program
MCA	Multiple Correspondence Analysis
MDPI	Multidisciplinary Digital Publishing Institute
MDS	Multidimensional Scaling
MLM	Multilevel Modeling
NDVI	Normalized Difference Vegetation Index
PET	Physiological Equivalent Temperature
PLS-SEM	Partial Least Squares Structural Equation Modeling
PRISMA-ScR	Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews
QCA	Qualitative Comparative Analysis
RESTOR-URBAN	Restorative Exposure & Stress-Transformation in Urban Tourism Systems
SEM	Structural Equation Modeling
SuSy	MDPI's Submission System
UTCI	Universal Thermal Climate Index
VR	Virtual Reality

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