

The Role of Natural Soundscapes in Psychological Restoration in Urban Public Spaces

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ABSTRACT

As urbanization picks up speed, city people experience less exposure to natural settings and more noise pollution, which causes psychological stress. Birdsong, running water, and rustling leaves are examples of natural soundscapes that have been shown to have profoundly positive psychological impacts. This study examines how natural soundscapes might aid in psychological healing in urban public areas, examines how they can improve mood, reduce stress, and regain focus, and summarizes real-world uses in a variety of urban contexts. According to research, natural soundscapes not only improve mental health but also positively impact physiological markers, providing urban residents with an inexpensive, easily accessible, and non-invasive means of achieving psychological healing. In order to improve the psychological well-being and quality of life of locals, this paper attempts to offer theoretical underpinnings and useful recommendations for urban public space design.

Keywords: Natural soundscapes, Urban public spaces, Psychological restoration, Stress recovery, Environmental psychology

INTRODUCTION

Urbanization has increased noise levels and decreased exposure to the outdoors, which has made city people more psychologically stressed (Gilmour et al., 2024). Birdsong, running water, and rustling leaves are examples of natural soundscapes that are becoming more widely acknowledged as essential environmental elements with healing properties (Bai & Zhang, 2024; Longman et al., 2025). The purpose of this essay is to examine how natural soundscapes in urban public areas contribute to psychological healing. A study of empirical investigations, field experiments, and pertinent environmental psychology theories—particularly Attention Restoration Theory (ART) and Stress Recovery Theory (SRT)—is used to synthesize findings from previous research (Dong & Kong, 2025). Exposure to natural soundscapes has been shown to increase mood, lower subjective stress, encourage focus restoration, and have good impacts on physiological markers including heart rate variability (Korpilo et al., 2024; Yoon & Jeon, 2024). These results have been confirmed in a variety of urban environments, such as parks, waterfront areas, and walkways. However, the generalizability of these findings is limited by methodological differences and dispersed study contexts. For a thorough analysis, future research should incorporate multisensory experiences and use standardized assessment instruments. In order to achieve accessible, affordable, and non-intrusive psychological healing effects, natural soundscapes should be intentionally incorporated into public space design. In general, natural soundscapes play a vital role in promoting urban people's mental wellbeing.

MECHANISMS OF PSYCHOLOGICAL RESTORATION

The following paths are the main ways that natural soundscapes facilitate psychological healing. First, an environment's perceived healing qualities are enhanced by natural soundscapes. In contrast to mechanical or road noise, bird song considerably increased participants' evaluations of environmental restorativeness, according to a study on bird song soundscapes in parks (Yuqi et al., 2024). Both the type of sound source and the context of the soundscape have an impact on restorative benefits, as seen by differences in restorative evaluations across different bird species, seasons, and elevation levels (Bai & Zhang, 2024).

Second, mood and perceived stress levels are directly improved by natural soundscapes. Exposure to natural soundscapes alone, such as birdsong and flowing water, significantly lowered participants' anxiety and stress levels, while the addition of traffic noise lessened the restorative effect, according to an experiment looking at mixed natural and traffic noise in an urban setting (Xinhui et al., 2021). This illustrates how natural soundscapes have the innate ability to encourage emotional relaxation and lessen subjective tension.

Thirdly, physiological recuperation is positively impacted by natural noises. According to field experiments conducted by Korpilo et al. (2024), exposure to surroundings with high visual and aural quality caused participants' electrodermal activity (EDA) to swiftly diminish, suggesting that natural soundscapes induce physiological rest and recuperation. Additionally, natural soundscapes improve heart rate variability (HRV), lower heart and respiratory rates, and lower participants' self-reported anxiety and despair, according to Yoon and Jeon's (2024) virtual reality trials.

Finally, healing results may be enhanced by the multimodal synergistic effects of natural soundscapes. Forest soundscapes boost mood, encourage attentional recovery, and increase cognitive function, according to research by Longman et al. (2025). However, no discernible benefits were seen on specific physiological stress or immunological indicators. This implies that soundscapes are complicated healing pathways combined with ecological sense and environmental aesthetics, rather than just being auditory experiences.

In conclusion, natural soundscapes in urban public areas promote inhabitants' mental health and well-being through a composite mechanism that includes multisensory synergy, emotional and stress reduction, physiological relaxation and recuperation, and perceptual augmentation of restorativeness. Beyond just visible vegetation, soundscape quality and design should be given top priority in urban planning and public space design.

Evidence from Urban Contexts

The quality of soundscapes in urban parks and green spaces and their effects on human psychology and behavior have been the subject of an increasing number of research in recent years, offering scientific support for the restorative function of natural soundscapes in urban public places.

First, the choice of soundwalk routes greatly affects participants' assessments of the soundscape, according to a study looking at soundwalk paths in various urban parks. Participants rated the environment's comfort and restorative aspects higher when trails passed through vegetated regions with a high concentration of natural sound sources. On the other hand, restorative scores significantly decreased when close to hard-surfaced areas or traffic sounds. These results show that natural noises and spatial arrangement work together to form soundscape experiences in actual urban park settings (Sun et al., 2023).

Second, when vegetation space and soundscapes in urban green spaces were analyzed, it was found that areas

with dense understorey vegetation and distance from major roads had both significantly less anthropogenic noise (traffic sounds) and higher volumes and diversity of biophonic sounds (such as birdsong). The types of surrounding land cover and vegetation structure are important indicators of "good" soundscapes (high natural sounds + low mechanical noises) (Liu et al., 2024; Uebel et al., 2025). This implies that natural soundscape quality in urban parks can be improved by landscape design interventions, such as adding more shrubs and groundcover and optimizing the layout of green spaces, resulting in more healing acoustic environments for humans.

Additionally, an empirical study combining visual-aural dual stimuli showed that people's mood, vitality, and general well-being are significantly better when urban green spaces concurrently feature natural visual landscapes (plants, water bodies, woodlands, etc.) and natural soundscapes (bird song, wind sounds, etc.) than when only visual or auditory stimuli are present. This suggests that natural soundscapes greatly improve urban dwellers' emotional and behavioral well-being through multisensory synergy between visual and auditory cues rather than acting in isolation (Minxuan et al., 2025).

In conclusion, these empirical studies from various countries, cities, and approaches—such as soundwalk surveys, sound source recordings with landscape structure analysis, and multisensory stimulation experiments—consistently show that: in common public spaces like urban parks and green spaces, people's perceptions of the soundscape, emotional states, restorative experiences, and spatial usage behaviors are greatly influenced by the quality and structure of natural soundscapes (biophony, geophony). To put it another way, natural soundscapes have great potential in actual urban settings to promote psychological healing, boost wellness, and enrich the urban experience.

DISCUSSION

Comprehensive Summary

Research has consistently shown that natural soundscapes in urban public spaces have a good impact on psychological healing. Results show that natural soundscapes reduce psychological stress, improve emotional states, encourage attentional restoration, and somewhat improve overall well-being, whether through soundwalk surveys, analysis of recorded sound sources, or experiments combining visual-auditory dual stimuli (Sun et al., 2023; Liu et al., 2024; Uebel et al., 2025; Minxuan et al., 2025). Simultaneously, the type of soundscape, volume, spatial layout, and multisensory coordination all have a substantial impact on the results of psychological rehabilitation. This study suggests that creating natural soundscapes in public locations, such as waterfront areas, urban green spaces, and walkways, can offer locals inexpensive, non-invasive psychological healing experiences.

Methodological Limitations and Future Directions

The psychological and physiological restorative effects of natural soundscapes have been empirically supported in recent years by an upsurge in study on the soundscapes of urban green spaces and parks (Shao et al., 2022; Abdelmoula et al., 2024; Zhang et al., 2024; Chen & Ma, 2025). However, these studies continue to have serious methodological flaws that limit the validity and applicability of their findings.

First off, a lot of research don't examine the psychological and physiological consequences of long-term, continuous exposure to natural soundscapes; instead, they rely on brief soundscape experiences or one-time questionnaires/field surveys (such soundscape walks) (Shao et al., 2022). One-time tests or assessments may not adequately represent the underlying cumulative impact of the soundscape exposure that urban inhabitants experience, which is usually intermittent, lengthy, and changeable.

Second, there are methodological differences between studies when it comes to how soundscape quality and psychological recovery are measured. While some studies integrate physiological or behavioral indicators (e.g., heart rate variability, skin conductance response, self-reported recovery) (Abdelmoula et al., 2024), others focus on subjective perceptions (e.g., soundscape pleasantness, restorative evaluations) (Shao et al., 2022; Zhang et al., 2024). Still others have tried visual-auditory multimodal scenarios (Chen & Ma, 2025). Although this diversity benefits the discipline, it also makes it difficult to compare studies directly, which makes systematic reviews and meta-analyses more difficult.

Additionally, sampling and spatial representativeness are still insufficient. Previous research has mostly concentrated on single cities or small samples of green spaces or parks (Zhang et al., 2024; Shao et al., 2022), with participants frequently selected from certain groups (e.g., volunteers or students). Broad sample coverage across locations, cultures, and a range of age and socioeconomic backgrounds is lacking. This limits how broadly and transferably research findings can be applied.

Furthermore, the majority of research ignores the complex relationships found in metropolitan public areas in favor of concentrating only on the soundscape itself. In actuality, the soundscape may interact with visual landscapes (greenery, water bodies, spatial layout), vegetation structure, biodiversity, social activities, seasonal variations, foot traffic, and usage behaviors to affect spatial experience and psychological recovery (Abdelmoula et al., 2024; Chen & Ma, 2025). Although several studies have tried multimodal design approaches, there is still a dearth of research that fully captures the experiences of urban dwellers in real-world contexts.

Lastly, there is still a dearth of research on design-oriented methods and soundscape treatments. Although previous research has examined the integration of natural soundscapes with urban green space design (e.g., multimodal landscape design) (Shao et al., 2022; Chen & Ma, 2025), there is still a dearth of systematic, long-term monitoring and assessment of the effects of soundscape optimization on behavior and mental health. To improve the usefulness and policy recommendations of research, future studies should use longitudinal designs, create standardized multidimensional indicator systems, increase sample and spatial representativeness, use multimodal research techniques, and concentrate on the long-term intervention effects of soundscape design.

PRACTICAL IMPLICATIONS

Recommendations for the Design of Urban Public Spaces

The beneficial effects of natural soundscapes on psychological healing and well-being suggest that acoustic environmental elements should be completely taken into account when designing urban public spaces. First, in order to minimize interference from traffic noise and improve the coverage of biophonic sounds (such birdsong and wind noise), green space layout and vegetation structure should be optimized (Shao et al., 2022; Zhang et al., 2024). Second, incorporating water features, tree-lined streets, or low-growing vegetation can produce acoustic buffers and multi-layered sound barriers, improving the environment's overall restorative quality (Chen & Ma, 2025). Additionally, the psychological benefits of soundscapes can be enhanced by multimodal landscape design, which integrates tactile, visual, and aural experiences. Thus, urban parks, greenways, and recreational areas should take into account the complementary interaction between landscape features and soundscapes (Abdelmoula et al., 2024).

Soundscape Planning and Management Strategy

Enhancing the psychological healing capacity of urban public places requires careful planning and control of the soundscape. First and foremost, urban planners must recognize and give top priority to the preservation of

excellent natural soundscape places, such as locations with a lot of birdsong, noticeable river flow sounds, and minimal mechanical noise (Zhang et al., 2024). In order to create more immersive and restorative acoustic settings, vegetation barriers, water feature placement, and layered planting strategies can reduce disruptions caused by traffic and industrial noise (Shao et al., 2022; Chen & Ma, 2025).

Additionally, while spatial use management preserves the integrity of natural soundscapes, regulatory frameworks may be implemented to limit high-noise activities in sensitive zones. Public satisfaction surveys and routine soundscape monitoring give input for dynamic management, guaranteeing the long-term preservation of soundscape quality (Abdelmoula et al., 2024). Lastly, public engagement programs and community education raise citizens' understanding of the significance of the natural soundscape, encouraging group stewardship to support the sustainability and psychologically restorative advantages of urban acoustic environments.

CONCLUSION

The Importance of Natural Soundscapes

In urban public places, natural soundscapes are essential for both physiological and psychological healing. Natural soundscapes, like birdsong, flowing water, and wind rustling leaves, have been shown to dramatically reduce psychological stress, improve emotional states, increase the ability to restore attention, and improve general well-being (Shao et al., 2022; Abdelmoula et al., 2024; Zhang et al., 2024; Chen & Ma, 2025). Through multimodal synergy (visual + auditory), these soundscapes not only improve psychological recovery but also offer acoustic comfort, turning urban public places into inexpensive, non-invasive settings for psychological healing.

The importance of natural soundscapes is further demonstrated by their ability to enhance the spatial experiences and behavioral patterns of urban dwellers. Excellent natural soundscapes make public areas more appealing and often used, which promotes leisure, exercise, and social interaction among locals and further improves their physical and emotional well-being (Zhang et al., 2024). Simultaneously, soundscapes are indicators of the quality of the urban ecological environment, reflecting the ecological health and diversity of vegetation in urban green areas and serving as a guide for management and planning (Shao et al., 2022).

The careful use of natural soundscapes is highly valuable in urban planning. Natural soundscapes should be incorporated into the general design and management plans for public areas like squares, parks, urban green spaces, and walkways. In order to maximize psychological restorative effects, mechanical noise disruptions can be minimized while increasing the coverage and diversity of biophonic sounds by the scientific arrangement of vegetation, water features, and spatial structures (Abdelmoula et al., 2024; Chen & Ma, 2025). Additionally, long-term sustainable development of urban auditory ecosystems is facilitated by raising citizens' understanding and conservation consciousness of natural soundscapes through educational and public engagement activities.

In conclusion, natural soundscapes are not only an essential part of urban public places' environmental experience, but they also play a major role in improving urban liveability, fostering inhabitants' mental health, and furthering sustainability. The prudent and scientific use of natural soundscapes need to be a basic tenet and goal in the planning and administration of public areas in the future.

The Design Significance of Appropriately Applying Natural Soundscapes

In urban public areas, natural soundscapes are important for improving wellbeing and psychological healing. According to research, natural sound sources like birdsong, flowing water, and wind rustling leaves not only

improve emotional states and reduce psychological stress, but they also encourage attentional restoration and general happiness (Shao et al., 2022; Abdelmoula et al., 2024; Zhang et al., 2024; Chen & Ma, 2025). The synergistic benefits of multimodal environments (visual + aural) greatly improve psychological recovery as compared to monosensory visual landscapes, turning urban public places into inexpensive, non-invasive spaces for mental healing.

Natural soundscapes must be used carefully in urban planning if their full potential is to be realized. The psychological healing potential of public places can be significantly increased by scientifically arranging natural sound sources, optimizing vegetation layouts, adding water features, and minimizing mechanical noise disruptions (Shao et al., 2022; Zhang et al., 2024). Simultaneously, combining soundscape management with spatial upkeep, public education, and involvement guarantees the sustainability of acoustic environmental quality while encouraging locals to appreciate and preserve the importance of natural soundscapes (Abdelmoula et al., 2024; Chen & Ma, 2025).

In conclusion, natural soundscapes are essential for improving urban public areas' user experience as well as for furthering sustainable development, improving urban liveability, and fostering inhabitants' physical and mental welfare. Natural soundscapes should be a fundamental component of public space design and urban planning in the future. The psychological restorative effects can be maximized by scientifically educated planning and management, giving urban people a better living environment.

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