

Green exercise and urban well-being: measurement, analysis, immersion and surveillance

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ABSTRACT

Rapid urbanisation, population ageing, and increasing physical inactivity present major challenges for public health and healthy city development worldwide. Green exercise — the combination of physical activity and exposure to natural environments — has emerged as an important approach for promoting physical, mental, and emotional wellbeing. This invited talk explores innovative interdisciplinary approaches to understanding, measuring, and promoting green exercise and urban wellbeing through big data analytics, immersive technologies, and artificial intelligence.

First, the presentation introduces the measurement and analysis of exercisality, using large-scale physical exercise trajectory data from China's most popular fitness application alongside spatial analysis. The study demonstrates how high-quality exercise landscapes can encourage healthier lifestyles and positive behavioural spillover effects. The talk also discusses opportunities for spatial intervention through urban and landscape design to enhance exercisality and promote active living.

Second, the talk examines the potential of immersive virtual green exercise using virtual reality technologies. Experimental studies and qualitative research conducted locally reveal both the opportunities and limitations of virtual reality environments for supporting exercise participation, particularly for disabled individuals and others facing barriers to outdoor physical activity in winter. Findings highlight the importance of accessibility, environmental realism, safety, and user experience in designing future immersive health interventions.

Finally, the presentation introduces emerging unmanned aerial vehicle and deep learning approaches for analysing gait and walking behaviour as biomarkers of urban health risk. Combining drone-based video capture, AI-driven pose estimation, trajectory tracking, and spatial mapping enables objective, real-time, and non-invasive monitoring of pedestrian movement and gait characteristics at urban scale. This approach offers promising applications for smart urban health surveillance, healthy ageing, and the reduction of health inequalities.

Overall, the talk demonstrates how integrating spatial analysis, big trajectory data, virtual reality, unmanned aerial vehicle, and AI can advance research and practice in green exercise, urban wellbeing, and healthy city development, contributing to broader goals of sustainable urban futures.