EGU24-9746, updated on 19 May 2024
https://doi.org/10.5194/egusphere-egu24-9746
EGU General Assembly 2024

Residential green space and summer heat stress: a repeated cross-sectional study

Eva Beele[1,5,6], Raf Aerts[2,3,6], Maarten Reyniers[4], and Ben Somers[1,5,6]

[1]Division Forest, Nature and Landscape, University of Leuven (KU Leuven), Leuven, Belgium
[2]Risk and Health Impact Assessment, Sciensano (Belgian Institute of Health), Brussels, Belgium
[3]Division Ecology, Evolution and Biodiversity Conservation, University of Leuven (KU Leuven), Leuven, Belgium
[4]Royal Meteorological Institute of Belgium, Brussels, Belgium
[5]KU Leuven Urban Studies Institute, University of Leuven (KU Leuven), Leuven, Belgium
[6]KU Leuven Plant Institute, University of Leuven (KU Leuven), Leuven, Belgium

Urbanization and global warming have led to the emergence of urban heat islands, profoundly impacting the liveability and long-term well-being of people living in cities. This study investigates the impact of urban green space composition and configuration on stress and sleep quality in Leuven, Belgium, during the summers of 2021 and 2022.

Utilizing three validated stress questionnaires (PSS, PSQI, and HSSI), we assessed mental health, sleep quality and heat stress during 4 heat and 4 control events for 785 respondents. Concurrently, we recorded risk and vulnerability factors related to physical sensitivity, socio-economic sensitivity and personal living space for each respondent. Urban land cover data at 50m and 250m buffer scales were analysed using composition and configuration metrics. Structural equation models were employed to investigate the impact of urban green space on stress and sleep quality during both heat and non-heat control events. Models were adjusted for risk and vulnerability factors, and effectively dealt with spatial autocorrelation inherent in our data.

During control events, mental health, sleep quality and heat stress were predominantly associated with risk and vulnerability factors. High physical sensitivity, elevated socio-economic sensitivity and suboptimal personal living spaces were associated with higher physiological stress, poor sleep quality, and higher heat stress. Conversely, during heat events, stress indicators were predominantly associated with the surrounding green space, while associations with risk and vulnerability factors were limited. Augmenting high green relative cover may mitigate heat stress, while increasing low green cover may alleviate both heat stress and enhance sleep quality. Stratified analyses for socio-economic status and distinct urban-rural regions revealed notable differences among subgroups.

In conclusion, this study emphasizes the importance of incorporating both low and high green spaces to mitigate heat stress and improve sleep quality and therefore, human health, during heat events.