

## Accepted Manuscript

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PII: S1618-8667(17)30411-9  
 DOI: <https://doi.org/10.1016/j.ufug.2018.01.018>  
 Reference: UFUG 26065

To appear in:

Received date: 3-7-2017  
Revised date: 6-1-2018  
Accepted date: 20-1-2018

Please cite this article as: Koprowska, Karolina, Łaszkiwicz, Edyta, Kronenberg, Jakub, Marcińczak, Szymon, Subjective perception of noise exposure in relation to urban green space availability. *Urban Forestry and Urban Greening* <https://doi.org/10.1016/j.ufug.2018.01.018>

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# Subjective perception of noise exposure in relation to urban green space availability

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## Highlights

- Urban green space can have both direct and indirect effects on noise
- Indirect effects on noise are related to the perception (self-reported) of noise exposure by urban residents
- Green space coverage in a buffer affects noise perception, but the effect is weak

Objective noise levels have the biggest influence on noise perception

## Abstract

Noise pollution has been recognized as one of major threats to the health of urban residents. Increasing green space availability can create a natural buffer to the adverse effects of living in an urban environment. These positive effects of urban green space can be directly related to an objective reduction of noise levels and – indirectly – to the subjective perception of noise exposure. In our study carried out in Lodz, Poland, we explored the relationship between objective noise levels and the subjective perception of noise exposure by urban residents in relation to urban green space availability. We refer to objective noise exposure expressed as GIS modelled  $L_{den}$  derived from noise maps (compliant with the Environmental Noise Directive, 2002/49/EC), and subjective (self-reported) perception of noise exposure as declared in a questionnaire-based survey. We compared the percentage of green space in a buffer, the objectively measured noise level, and the perceived exposure to noise to find the most appropriate radius of the green space buffer. We decided to choose the green space coverage which is not correlated with an objective noise level to avoid potential multicollinearity in regression models. This contrasts with most studies, in which the radius of the buffer is set *a priori*. We thus compared the selected buffer of green space coverage – 300 m (representing green space availability) – with perceived noise exposure. We used the spatial error probit model to differentiate the impacts of objective and subjective noise indicators, at the same time including also the factor of green space availability. We found out that the direct effect of objectively measured noise levels, education, the presence of noisy neighbours, and building characteristics were the most important variables influencing the self-reported perception of noise by urban residents. The indirect effect of green space availability on noise perception was not strong, yet statistically significant. Although our study does not provide clear-cut evidence, it indicates that the indirect, psychological effects of urban green spaces can positively affect the life satisfaction of urban residents.

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