

Title: Social Inequalities of Noise Exposure and Noise Annoyance

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Abstract:

Environmental noise is one of the most widespread environmental stressors in contemporary cities, yet its distribution and consequences are not experienced equally across social groups. This dissertation examines how socioeconomic factors directly and indirectly influence urban residents' annoyance toward different types of noise.

Building on perspectives from environmental justice, the production of urban space, and the social construction of noise, the dissertation reviews the historical development of urban soundscapes and noise studies. It uses an integrated theoretical framework linking socioeconomic factors to noise annoyance through three pathways: objective noise exposure, housing conditions, and noise sensitivity. Drawing on this framework, a series of empirical hypotheses is proposed and examined.

The empirical analyses use the data set that combines GIS-based objective noise exposure data with survey data from four European cities—Mainz, Hanover, Bern, and Zurich. Five types of noise annoyance are investigated: road traffic, train, aircraft, neighbor, and business noise. The hypotheses are examined using multivariate regression, mediation and moderation analyses. Quantile regression and random forest models are further employed as robustness checks.

The findings suggest that socioeconomic disparities in noise annoyance exist, but appear to vary by noise source and urban context. Higher income and educational attainment are generally associated with lower levels of annoyance through reduced noise exposure and more favourable housing conditions. The results also indicate that the noise sensitivity pathway may serve as a countervailing mechanism, particularly in the case of education: higher cultural capital appears to heighten perceptual sensitivity and thereby increase noise annoyance. Aircraft noise represents a notable exception: in Mainz and Bern, higher socioeconomic status is associated with greater aircraft noise annoyance, a pattern that may reflect the spatial overlap between

relatively affluent residential areas and aircraft flight paths. The role of migration background also varies considerably across cities. Furthermore, the analyses indicate that the three pathways do not operate independently. Housing quality appears to mitigate the relationship between objective noise exposure and subjective noise annoyance, whereas noise sensitivity tends to strengthen it, resulting in different patterns of environmental advantage and disadvantage across social groups.

This dissertation contributes to environmental sociology by integrating objective and subjective dimensions of noise inequality within a unified analytical framework. It further explores the concept of an auditory habitus as a means of understanding socially patterned differences in noise annoyance and extends the environmental shielding hypothesis to multiple types of environmental noise. Methodologically, it illustrates the value of combining spatial environmental data with survey-based perceptual measures across multiple urban contexts. The findings also carry policy implications, suggesting that equitable noise mitigation might require not only reducing environmental noise exposure but also addressing inequalities in housing quality and other social conditions that shape residents' capacity to cope with environmental stressors.

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