Transportation noise impairs cardiovascular function without altering sleep: the importance of autonomic arousals

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 4529954
Author(s) Thiesse, L.; Rudzik, F.; Kraemer, J. F.; Spiegel, K.; Leproult, R.; Wessel, N.; Pieren, R.; Héritier, H.; Eze, I. C.; Foraster, M.; Garbazza, C.; Vienneau, D.; Brink, M.; Wunderli, J. M.; Probst-Hensch, N.; Röösli, M.

Author(s) at UniBasel Héritier, Harris ; Eze, Ikenna ; Foraster Pulido, Maria ; Vienneau, Danielle ; Probst Hensch, Nicole ; Röösli, Martin ;
Year 2020

Title Transportation noise impairs cardiovascular function without altering sleep: the importance of autonomic arousals

Journal Environmental research

Volume 182

Pages / **Article-Number** 109086
Aims: Chronic exposure to nocturnal transportation noise has been linked to cardiovascular disorders with sleep impairment as the main mediator. Here we examined whether nocturnal transportation noise affects the main stress pathways, and whether it relates to changes in the macro and micro structure of sleep. Methods and results: Twenty-six young healthy participants (12 women, 24.6 ś 0.7 years, mean ś SE) spent five consecutive 24-h days and one last morning in the laboratory. The first (baseline) and last (recovery) nights comprised a quiet ambient scenario. In-between, four different noise scenarios (low/medium/high intermittent road or rail scenarios with an identical equivalent continuous sound level of 45 dB) were randomly presented during the 8-h nights. Participants felt more annoyed from the transportation noise scenarios compared to the quiet ambient scenario played back during the baseline and recovery nights ($F_{5,117} = 10.2$, $p < 0.001$). Nocturnal transportation noise did not significantly impact polysomnographically assessed sleep macrostructure, blood pressure, nocturnal catecholamine levels and morning cytokine levels. Evening cortisol levels increased after sleeping with highly intermittent road noise compared to baseline ($p = 0.002$, noise effect: $F_{4,83} = 4.0$, $p = 0.005$), a result related to increased cumulative duration of autonomic arousals during the noise nights ($F_{5,106} = 3.4$, $p < 0.001$; correlation: $r_{pearson} = 0.64$, $p = 0.006$). Conclusion: Under controlled laboratory conditions, highly intermittent nocturnal road noise exposure at 45 dB increased the cumulative duration of autonomic arousals during sleep and next-day evening cortisol levels. Our results indicate that, without impairing sleep macrostructure, nocturnal transportation noise of 45 dB is a physiological stressor that affects the hypothalamic-pituitary-adrenal axis during the following day in healthy young good sleepers.
Publisher Elsevier

ISSN/ISBN 1096-0953

edoc-URL https://edoc.unibas.ch/75658/

Full Text on edoc No;

Digital Object Identifier DOI 10.1016/j.envres.2019.109086

PubMed ID http://www.ncbi.nlm.nih.gov/pubmed/32069756

Document type (ISI) Journal Article