

Background & Objectives

- Data from animal models and experimental data indicate e.g. increases in stress pathways, inflammation and oxidative stress in response to noise (Münzel et al. 2021)
- There is a lack of observational studies examining the association between environmental noise and the immune response/inflammation in humans

Methods

Study Design & Study Population

- Cross sectional design
- Participants from the KORA FIT study (2018/2019), Augsburg, Germany
- 58-69 years of age

Road Traffic Noise Exposure

- Mapped for all participants of the Augsburg agglomeration in 2017 by the Bavarian Environmental Agency
- Expressed as maximum L_{den} , 24-h
- Lower cut-off value of 40 dB(A)

Outcomes

- Leukocytes:** Total white blood cell count (WBC count), Granulocytes (Eosinophils, Neutrophils, Basophils), Monocytes, Lymphocytes
- High-sensitivity C-reactive protein (hs-CRP)**
- Biomarkers of the OLINK inflammation panel**

Statistical Analyses

- Multiple linear regression models adjusted for age, sex, month of blood draw, and further adjusted for lifestyle factors, $PM_{2.5}$, NO_2 , comorbidities and medication, mediators, respectively
- Forward selection of a priori defined confounders
- Effect modification by age, sex, body mass index (BMI), stress (Perceived Stress Scale, PSS-10), hypertension and multimorbidity

Results

- No associations with the differential blood count and hs-CRP could be observed
- Significant associations were found for MCP3 (increased) and CXCL1 (decreased) across all models
- Age, sex BMI and hypertension did not influence the effects
- Associations were partly modified by perceived stress and multimorbidity

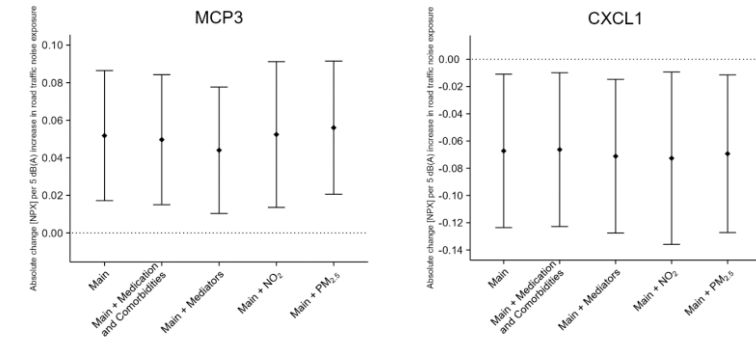


Figure 1: Absolute changes and 95% confidence intervals (CI) from the arithmetic mean per 5 dB(A) increase in maximum L_{den} road traffic noise exposure

Conclusion

- This observational study contributes to the understanding of pathways involved in cardiometabolic disease development following road traffic noise
- No associations between long-term road traffic noise, hs-CRP and the differential blood count could be observed
- Absolute changes in MCP3 and CXCL1 point towards an involvement of immunological/ inflammatory processes in disease development
- Perceived stress and multimorbidity might play a role

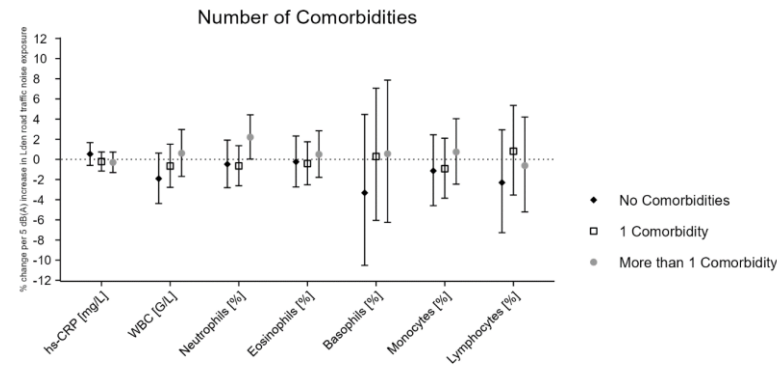


Figure 2: Effect modification by multimorbidity: Percent changes and 95% confidence intervals (CI) from the geometric mean per 5 dB(A) increase in maximum L_{den} road traffic noise exposure

References

Münzel T, Sørensen M, Daiber A. Transportation noise pollution and cardiovascular disease. Nat Rev Cardiol. 2021 Mar 31. doi: 10.1038/s41569-021-00532-5.