

## Publication

### Is physical activity a modifier of the association between air pollution and arterial stiffness in older adults: The SAPALDIA cohort study

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Air pollution and insufficient physical activity have been associated with inflammation and oxidative stress, molecular mechanisms linked to arterial stiffness and cardiovascular disease. There are no studies on how physical activity modifies the association between air pollution and arterial stiffness. We examined whether the adverse cardiovascular effects of air pollution were modified by individual physical activity levels in 2823 adults aged 50-81 years from the well-characterized Swiss Cohort Study on Air Pollution and Lung and Heart Diseases (SAPALDIA).; We assessed arterial stiffness as the brachial-ankle pulse wave velocity (baPWV [m/s]) with an oscillometric device. We administered a self-reported physical activity questionnaire to classify each subject's physical activity level. Air pollution exposure was estimated by the annual average individual home outdoor PM10 and PM2.5 (particulate matter <math><10\mu\text{m}</math> and <math><2.5\mu\text{m}</math> in diameter, respectively) and NO<sub>2</sub> (nitrogen dioxide) exposure estimated for the year preceding the survey. Exposure estimates for ultrafine particles calculated as particle number concentration (PNC) and lung deposited surface area (LDSA) were available for a subsample (N=1353). We used mixed effects logistic regression models to regress increased arterial stiffness (baPWV  $\geq 14.4$  m/s) on air pollution exposure and physical activity while adjusting for relevant confounders.; We found evidence that the association of air pollution exposure with baPWV was different between inactive and active participants. The probability of having increased baPWV was significantly higher with higher PM10, PM2.5, NO<sub>2</sub>, PNC and LDSA exposure in inactive, but not in physically active participants. We found some evidence of an interaction between physical activity and ambient air pollution exposure for PM10, PM2.5 and NO<sub>2</sub> (pinteraction=0.06, 0.09, and 0.04, respectively), but not PNC and LDSA (pinteraction=0.32 and 0.35).; Our study provides some indication that physical activity may protect against the adverse vascular effects of air pollution in low pollution settings. Additional research in large prospective cohorts is needed to assess whether the observed effect modification translates to high pollution settings in mega-cities of middle and low-income countries.

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