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Impacts of active transport on health

with a focus on physical activity, air
pollution, and cardiovascular disease

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Title

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Abstract

Background: There are increasing number of health impact assessment studies investigating the health effects by transferring trips made by motorised transport to active commuting; however, air pollution exposure during active commuting and its impact on health has been less thoroughly assessed. It is furthermore uncertain whether there is any interaction effect between air pollution and physical activity for the risk of cardiovascular diseases. The overall aim of the thesis was to improve the knowledge base for assessments of the total impact on health of a mode shift resulting in both increased physical activity and increased air pollution exposure, especially regarding combined effects on cardiovascular risks.

Methods: The thesis is based on four studies. In Study I, methodological issues related to the assessment of air pollution in previous studies on the health impact of changes in transport mode were critically reviewed. In Study II, the effect of leisure time and active commuting physical activity, on chronic diseases was quantified by conducting a random-effect meta-analysis. In two prospective cohort studies, participants of the Västerbotten Intervention Programme living in the Umeå region were studied to assess the impact as well as interaction effect of physical activity and air pollution on the incidence (Study III) and recurrence (Study IV) of cardiovascular diseases.

Results: In previous studies on the health impact of changes in transport mode, there was a large methodological discrepancy between studies due to different assumptions for air pollution exposure assessments in general populations and commuters as well as methods for estimation of impacts. Random-effect meta-analyses showed a beneficial effect of leisure time physical activity and active commuting on morbidity among individuals performing these activities at the minimum level of physical activity recommended by WHO, equivalent to 11.25 MET-hours per week. Beneficial effects of exercise on first-incident ischemic heart disease (IHD) were observed among individuals with high residential PM₁₀/PM_{2.5} concentrations, but not among individuals with low concentrations. Adverse effects associated with high residential PM₁₀ and PM_{2.5} concentrations were only observed among the individuals whom less frequently exercised. A statistically significant interaction effect was found between air pollution and exercise in training clothes for first-incident IHD but not for recurrence of IHD/stroke.

Conclusions: The results in this thesis strengthen the public health message that physical activity is beneficial for cardiovascular health, even in areas with air pollution. Therefore, public health and transport policies should be designed to improve population health through promotion of active transport and mitigation of air pollution.

Keywords

Health impact assessment; Air pollution; Active commuting; Exercise; Interaction; Cardiovascular diseases; Ischemic heart diseases; Stroke

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