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Greenery Surrounds Homes, which are Free of Traffic Noise, Air Pollution and Other Health-Related Annoyances

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Introduction

Self-perceived general health (SGH) is one of the most comprehensive and widely used indicators of health status and a powerful death predictor. In contrast, only a small number of studies investigated the effects of various environmental exposures on SGH. Our objective was to examine the connections that exist between low SGH in the Netherlands and residential exposure to greenery, air pollution, and traffic noise in the area. We linked data on long-term residential exposure to nearby greenery based on the Normalized Difference Vegetation Index (NDVI) and a land-use database (TOP10NL), air pollutant concentrations (including particulate matter (PM10, PM2.5), and nitrogen dioxide (NO2)), and road- and rail-traffic noise in order to create a study population of 354,827 adults. In multi-exposure models, associations with air pollution and the surrounding greenery were frequently still present, albeit less so. Joint odds ratios (JOR) of exposure to air pollution, rail traffic noise, and less nearby greenery were higher than the odds ratios of single-exposure models. Studies that only take into account one of these correlated exposures run the risk of underestimating the risk of multiple exposures and overestimating the risk of poor SGH that is associated with the exposure being studied. Every day, people are exposed to a variety of environmental factors that may have an effect on their health.

Pathophysiological changes that affect how diseases develop over a person's lifetime and ultimately lead to premature death can be caused by sustained and repeated exposures. The total number of exposures a person experiences from conception to death is referred to as an "exposome." The exposome is made up of several domains, including but not limited to traffic noise, air pollution, and nearby vegetation as environmental exposures. Air pollution has been linked to an increase in non-accidental and cause-specific mortality, such as deaths from cardiovascular and respiratory diseases. Additionally, a number of studies have found a link between dementia, Parkinson's disease, and Alzheimer's disease [1-3].

Description

Environmental exposures, air pollution, and traffic noise typically have a geographic component. The positive correlation between air pollution and road traffic noise is due to the fact that motorized traffic is a common cause. Due to the restriction on emissions transmission and the absence of sources of air pollution and traffic noise in green spaces, there is generally a negative link between air pollution, traffic noise, and the surrounding green. Using single-exposure models to estimate connections between the environment's greenery, air pollution, and traffic noise can result in an overestimation of effects because information about the risk of one of these exposures may be partially attributed to another correlated exposure. We conducted mediation studies to ascertain whether lower levels of traffic noise or air pollution are plausible explanations for the potential beneficial effects of green surroundings on low SGH. We specifically identified air pollution and traffic noise as mediators of the relationships between poor SGH and the surrounding green and hypothesized that there was a causal relationship between the two. We chose only the potential "mediator" factors (air contaminants and traffic noise) that were significantly linked (increased ORs) with poor SGH for the mediation studies.

The surrounding vegetation, air pollution, and traffic noise all interact in complex ways. Air pollution and traffic noise reduction may be on the presumed causal pathway of surrounding green to health, as green barriers may either limit the dispersion of traffic noise and air pollution or scavenge air pollution. However, these mechanisms can only explain some of the empirical relationships between nearby vegetation, air pollution, and traffic noise. More important is the fact that greener areas have lower levels of air pollution and traffic noise because there are fewer sources of both. This does not indicate a connection between the health of the surrounding vegetation; rather, it comes from the same source [4,5].

We focused specifically on the connection between prolonged exposure to nearby greenery, air pollution, and road noise, as well as any potential confounding effects. We also looked at mediation to see if there were plausible processes behind the positive connections between nearby green and low SGH, such as lower levels of traffic noise and air pollution. Therefore, for the confounding analysis, we hypothesized that traffic noise and air pollution were not on the path from the green environment to health but rather on the path from the green environment to the mediation analyses, where we hypothesized that they were. We used logistic regression analysis to see if environmental exposures were linked to low SGH.

Conclusion

JORs of exposure to a combination of air pollution, rail traffic noise, and reduced vegetation were always higher than those of single-exposure models. This demonstrates that the other related exposures only contain a portion of the information about the risk of one exposure, and that if only one of these exposures is taken into account when calculating the effect, the overall effect of an intervention that affects exposure to air pollution, train noise, and nearby green spaces is underestimated. However, if the OR of the single-exposure model is used, the individual effect of traffic-related air pollution, such as NO_2, on low SGH is overstated.

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