## Ambient Air Pollution and Depressive Symptoms in Older Adults: Wellenius et al. Respond

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Ambient Air Pollution and Depressive Symptoms in Older Adults

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Wang et al. (2014) investigated the relationship between ambient air pollution and depressive symptoms in a prospective study of elderly people over age 65 years. We are very surprised that the authors found no association between ambient air pollution and depressive symptoms, which is inconsistent with most previous studies (e.g., Banerjee et al. 2012; Calderón-Garcidueñas et al. 2014). A study of a population of elderly men indicated one potential biological mechanism may be methylation, which was decreased after acute exposure to fine particulate matter (Madrigano et al. 2012).

We identified three issues with the study by Wang et al. (2014). First, these authors used outdoor air pollution as the exposure of interest. Long-term exposure was estimated based on residential distance from the nearest major roadway. Considering only residential distance to the nearest major roadway, without taking into account other sources of exposure, may be insufficient to accurately estimate long-term exposure to traffic pollution. Short-term exposure to ambient air pollution was estimated based on pollutant levels measured at only one monitoring site, the Harvard–U.S. Environmental Protection Agency Supersite stationary ambient monitoring site. In this investigation we examined associations with short-term exposure to ambient fine particulate matter mass, sulfate, black carbon, and ultrafine particles measured at the Harvard–U.S. Environmental Protection Agency Supersite, which is located < 20 km from the participants’ homes. Particle measurements from this monitoring site have been shown to be strong proxies for personal exposure to particles of ambient origin (Brown et al. 2009) and have been used in hundreds of prior studies. Nonetheless, as we acknowledged in our article, exposure misclassification likely resulted in wider confidence intervals for our effect estimates, but is not expected to have biased our results (Zeger et al. 2000). We also failed to find evidence of an association with long-term exposure to traffic pollution based on both residential proximity to major roadways and residential black carbon levels predicted by a spatiotemporal model (Gryparis et al. 2009). Both of these exposure metrics have been used in a large number of air pollution health effects studies in the Greater Boston area, most of which have found associations with a large spectrum of health outcomes (Hart et al. 2014; Lue et al. 2013; Suglia et al. 2008; Wellenius et al. 2012; Wilker et al. 2013).

Gao et al. (2015) further suggest that our null results might be due to excessive exposure measurement error stemming from the use of pollutant concentrations measured at a single stationary monitoring site. In this investigation we examined associations with short-term exposure to ambient fine particulate matter mass, sulfate, black carbon, and ultrafine particles measured at the Harvard–U.S. Environmental Protection Agency Supersite, which is located < 20 km from the participants’ homes. Particle measurements from this monitoring site have been shown to be strong proxies for personal exposure to particles of ambient origin (Brown et al. 2009) and have been used in hundreds of prior studies. Nonetheless, as we acknowledged in our article, exposure misclassification likely resulted in wider confidence intervals for our effect estimates, but is not expected to have biased our results (Zeger et al. 2000). We also failed to find evidence of an association with long-term exposure to traffic pollution based on both residential proximity to major roadways and residential black carbon levels predicted by a spatiotemporal model (Gryparis et al. 2009). Both of these exposure metrics have been used in a large number of air pollution health effects studies in the Greater Boston area, most of which have found associations with a large spectrum of health outcomes (Hart et al. 2014; Lue et al. 2013; Suglia et al. 2008; Wellenius et al. 2012; Wilker et al. 2013).

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Favorably, Gao et al. (2015) propose that our results stand in contrast to those of “most previous studies.” This may be true, but it is worth noting that there are very few other studies available for direct comparison, and thus these results remain very much an open research question. Additional studies in diverse populations are clearly needed to confirm or refute the presence of an association between air pollution and depressive symptoms.

The authors declare they have no actual or potential competing financial interests.

Gregory A. Wellenius,1 Petros Koutrakis,2 and Yi Wang3

1Department of Epidemiology, Brown University School of Public Health, Providence, Rhode Island, USA; 2Department of Environmental Health, Harvard T.H. Chan School of Public Health, Boston, Massachusetts, USA; 3Department of Environmental Health, Indiana University Richard M. Fairbanks School of Public Health, Indianapolis, Indiana, USA

E-mail: gregory_wellenius@brown.edu

REFERENCES


