

A METHOD FOR DETECTION OF RESIDUAL CONFOUNDING IN SPATIAL AND OTHER OBSERVATIONAL STUDIES

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Background and Aims: Detection of residual confounding is a difficult issue in observational studies. We recently described such a method and justified its use primarily for time-series studies (Flanders et al, 2009; Flanders et al 2011). The method depends on an indicator with two key characteristics: it is conditionally independent (given measured exposures and covariates) of the outcome in the absence of confounding, misspecification and measurement errors; second, it is associated with the exposure and, like the exposure, with unmeasured confounders. We proposed using future exposure levels as the indicator to detect residual confounding. This was a seemingly natural choice for time-series studies because future exposure cannot have caused the event yet could be spuriously related to it. A related question of interest – that addressed here - is whether an analogous indicator exists that can be used to identify residual confounding in a study based on spatial, rather than temporal contrasts.

Methods: Using directed acyclic graphs and specific causal relationships, we show that future air pollution levels may have the characteristics appropriate for an indicator of residual confounding in spatial studies of environmental exposures

Results: In simulations based on a spatial study of ambient air pollution levels and birth weight in Atlanta, with ambient air pollution one year after conception as the indicator, we were able to detect residual confounding. For the study size used, the discriminatory ability approached 100% for some factors intentionally omitted from the model, but was very weak for others.

Conclusions: The simulations illustrate that the indicator based on future exposures can have excellent ability to detect residual confounding in spatial studies, although performance varied by situation and study size.

References:

Flanders WD, Klein M, Strickland M, et al. A method of identifying residual confounding and other violations of model assumptions. Presented at ISEE 2009.

Flanders WD, Klein M, Strickland M, et al. A Method for Detection of Residual Confounding in Time-Series and Other Observational Studies. *Epidemiology* 2011;22:59-67.