A Bayesian finite mixture of bivariate regressions model for causal mediation analyses

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Building on the work of Schwartz, Gelfand and Miranda (Statistics in Medicine (2010); 29(16), 1710-23), we propose a Bayesian finite mixture of bivariate regressions model for causal mediation analyses. Using an identifiability condition within each component of the mixture, we express the natural direct and indirect effects of the exposure on the outcome as simple functions of the component-specific regression coefficients. On the basis of simulated data, we examine the behaviour of the model for estimating these effects in situations where the associations between exposure, mediator and outcome are confounded, or not. Additionally, we show that this mixture model can be used to account for heterogeneity arising through unmeasured binary mediator-outcome confounders. Finally, we apply our mediation mixture model to estimate the natural direct and indirect effects of exposure to inhaled corticosteroids during pregnancy on birthweight using a cohort of asthmatic women from the province of Québec. Applications to genetic data are forthcoming.

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