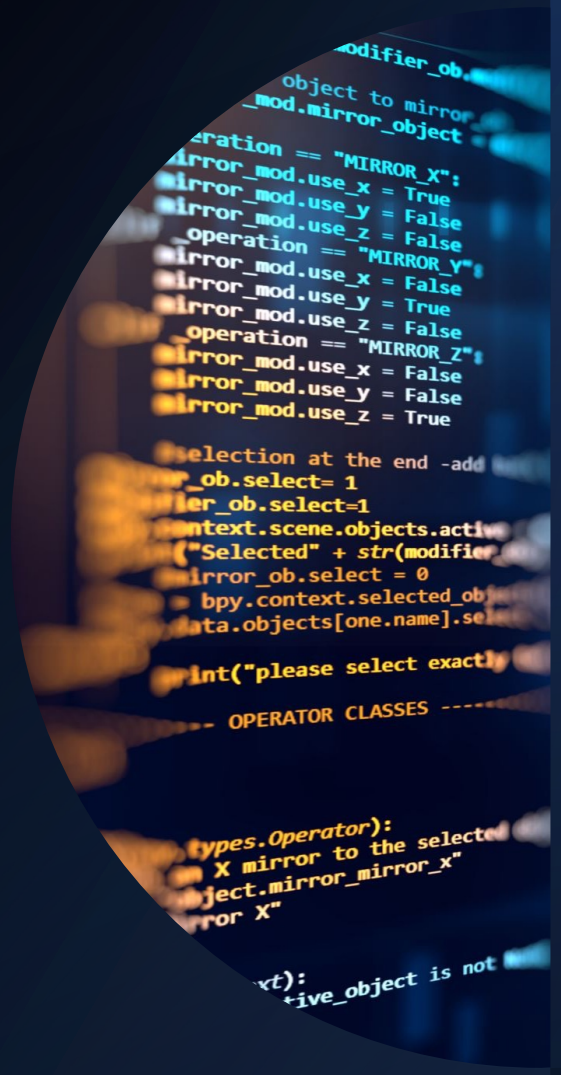

Advance causal inference analysis in R: A software Review

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Purpose of the study

- The uptake of causal inference methods developed to account for confounding when estimating time-dependent treatment effects under an observational setting is limited in application.
- Conducted a software review for time-dependent causal inference methods including marginal structure models, g-computation and targeted maximum likelihood estimation.
- Three software packages in the R: *ipw, gfoRumla,* and *ltmle*.

Methods and Results

- Simulated three two-visit time-dependent treatment data sets with a continuous outcome, a binary outcome, and a continuous outcome with right censoring.
- Applied each package to the three simulated data sets to estimate the average treatment effect and assessed key features of the package.
- *gfoRmula:* does not automatically return odds ratio for binary outcome data, so we need to loop over the package to obtain the bootstrap confidence interval for OR.
- *ipw:* not as flexible as *gfoRumla* and *ltmle* in model specification of the time-dependent treatment model.
- *ltmle: can* implement all three methods and can employ machine learning algorithms in the fitting of both treatment and outcome models.