

The case-time-control design. Basic theory and extensions

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To estimate causal effects from observational data it is crucial to control for confounding. A common way to control for unmeasured confounding is to use the individual as his/her own control. By comparing the outcome risk under exposed and unexposed time-periods, within the same individual, the analysis automatically controls for all confounders that are stationary in time, e.g. genetic makeup. In principle, time-varying confounders can be additionally controlled for by regression modelling, provided that these are measured. In practice though, standard regression techniques may fail when the time-varying confounders are monotonically increasing, like age and calendar time. The case-time control design has been proposed as a tool to control for monotonically increasing confounders, while still using the individual as his/her own control. In this presentation we will explain when and why standard regression techniques fail when controlling for monotonically increasing confounders, and we will explain how the case-time control design intends to solve this problem. The original formulation of the case-time-control design is only applicable to binary variables. We will demonstrate how the design can be extended, to allow for arbitrary variables.

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