

國立中正大學數學系

暨應用數學碩士班、統計科學碩士班

學 術 演 講

**Quasi-instruments for causal mediation analysis: from association to causation when randomized controlled trials are infeasible**

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**Abstract**

Randomized controlled trials (RCTs) are often considered the gold standard for testing causal hypotheses and exploring causal mechanisms. However, there are many situations, such as genomics studies, where RCTs are not feasible or pose ethical concerns. In these cases, observational studies are more flexible but face the challenge of confounding effects among variables. Confounding effects can make it difficult to distinguish between association and causation and to understand causal relationships. To address this challenge, instrumental variables (IVs) are crucial for moving from association to causation.

This presentation focuses on causal mediation analysis, a powerful technique used to assess how exposure affects the outcome of interest through an intermediary variable (mediator). A new IV-based method for conducting causal mediation analysis is introduced, which relaxes the assumption of no unmeasured mediator-outcome confounding in observational studies. A corresponding multiply robust estimator is derived to mitigate the problem of model misspecification. It has been shown that the proposed estimator is consistent and asymptotically normal and achieves the semiparametric efficiency bound.

As an illustration, the proposed method is applied to genomic datasets of lung cancer to investigate the potential role of the epidermal growth factor receptor in treating lung cancer.

**日期: 112年4月26日(星期三) 16:10~17:00**

**地點: 本校數學館 527 教室 (嘉義縣民雄鄉大學路 168 號)**

**茶會: 15:30~16:00 數學館四樓 409 室舉行**

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