

**A new causal mediation approach based on observational mediation modeling and  
instrumental variable regression**

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## Abstract

Causal mediation analysis of data from randomized studies has recently been recommended for strengthening causality in research aimed at exploring the mechanism underlying a treatment effect. A typical experimental design consists of two experiments with the mediator measured in the first and manipulated in the second experiment. In this way, causal inferences can be drawn regarding the relationship between the mediator and the dependent variable. However, there are two concerns with existing approaches. First, to make the results from the two experiments comparable, the mediator in experiment 1 and the mediator in experiment 2 are conceptually deemed as the same variable. This assumption is often problematic because the mediators of interest in social psychology are often latent, continuous psychological constructs, which cannot be equated with the manipulation (e.g., a writing task for priming) of such a construct. Second, existing approaches largely overlook the possibility of other omitted mediator(s) covarying with the mediator of interest. This type of confounding cannot be eliminated by experimental manipulation of  $X$  and  $M$ , and ignoring such confounding can lead to biased estimates of the indirect effect. To address these concerns, we propose a new causal mediation approach for randomized studies based on the traditional observational mediation modeling framework and instrumental variable regression. We conduct Monte Carlo simulation studies to assess the proposed method's performance in parameter estimation and hypothesis testing compared to the existing methods, including Imai's causal mediation analysis, as well as the widely used analytical approaches for experimental-causal-chain and moderation-of-process designs.

*Keywords:* causal inference in mediation, causal mediation analysis, manipulation-of-mediator designs, instrumental variable regression in mediation