



Testing criminological theory through causal mediation analysis: Current status and future directions☆



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ABSTRACT

Purpose: The purpose of this paper was three-fold: 1. Present an overview of the core requirements of causal mediation analysis; 2. Evaluate the quantity and quality of current mediation research in criminology and criminal justice; 3. Demonstrate the proper use of causal mediation analysis in testing criminological theory.

Methods: Core requirements in conducting causal mediation analysis are examined, followed by a review of mediation research published in the last 10 issues of 8 high-ranking criminology and criminal justice journals. Recommendations are then offered.

Results: Five core requirements (causal order, causal direction, confirmatory model, evaluating significance, and sensitivity testing) for causal mediation analysis are identified. A survey of top journals in criminology and criminal justice revealed that while mediation analysis is commonly found in the literature, most studies violate one or more of the core requirements of the causal mediation method. In addition to exploring simple mediation, multiple mediation and moderation are also discussed.

Conclusions: Causal mediation analysis has a great deal to offer the fields of criminology and criminal justice, particularly when it comes to building, testing, and integrating theories. To be effective, however, the method must be properly utilized and implemented.

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1. Introduction

Criminology is a field that prides itself on theory. It is somewhat ironic, then, that theory in criminology has sometimes been criticized for poor integration, due perhaps to a plethora of single-variable theories (Agnew, 2011; Bernard & Snipes, 1996; Farrington, 2003; Laub & Sampson, 2003). Fortunately, theory in criminology has advanced significantly in recent years. Early attempts at integration, such as Elliott, Ageton, and Canter's (1979) integrated theory of crime, have paved the way for a growing number of multifaceted criminological theories. These attempts at integration include, Thornberry's (1987) interactional theory, Braithwaite's (1989) reintegrative shaming theory, Tittle's (1995) control balance theory, Akers' (1998) social learning-social structure theory, Colvin, Cullen, and Vander Ven's (2002) differential coercion and social support theory, and Wikström's (2004) situational action theory. Even single-variable theories, like Gottfredson and Hirschi's (1990) general theory of crime, postulate mediated relationships between key variables. Gottfredson and Hirschi (1990), for instance, hypothesize that low self-control mediates the relationship between weak parental control and subsequent delinquency, a supposition that has received a fair amount of research support (Kort-Butler, Tyler, & Melander, 2011; Simons, Simons, Chen, Brody, & Lin, 2007).

A criminological theory in which mediation takes center stage is Agnew's (1992) general strain theory. Agnew (2006), like Elliott et al. (1979) before him, believes that strain is mediated by bonding experiences and exposure to delinquent peers. In a recent study on this subject, Johnson, Morris, and Menard (2015) determined that the relationship between strain and delinquency was mediated by several different social bonding (family involvement, school involvement) and social learning (exposure to delinquent peers, moral beliefs) variables. Not only can mediation be used to test individual-level theories, it can also be used to test group-level theories. Gau, Corsaro, and Brunson (2014), for instance, tested broken windows theory in an attempt to determine whether the relationship between neighborhood disorder and fear is mediated by social cohesion and shared expectations for social control. The results revealed support for the hypothesized mediating relationships, although the manner in which the analysis was carried out in this and several previously mentioned studies was inconsistent with best practices in contemporary causal mediation analysis. These studies highlight the value of causal mediation analysis for criminological research while emphasizing the need for greater attention to the central tenets of causal mediation analysis when testing criminological theory.

The current paper was written with three principal objectives in mind. The first objective was to provide a comprehensive review of causal mediation analysis as a research strategy. Five core requirements for conducting competent mediation research (causal order, causal direction, confirmatory model, evaluating significance, and sensitivity testing) are presented in the opening section of this paper as a means of providing guidelines for proper implementation of the mediation model. Second, a review of research published over the past several years in eight major criminology and criminal justice journals was performed in an effort to verify the quantity and quality of mediation research currently being produced in the fields of criminology and criminal justice. The proportion of articles testing mediation was calculated and each identified article evaluated against the five core criteria of competent causal mediation analysis. A third objective in writing this paper was to illustrate how best practices in causal mediation analysis can be used to test criminological theory and assist with ongoing efforts to integrate constructs from different models and theories. Future developments in theoretical criminology, it is argued, depend on our ability to make effective use of causal mediation analysis and related procedures such as moderation analysis, moderated mediation, and mediated moderation.

2. Causal mediation analysis

Causal mediation analysis is designed to assess whether one or more intervening variables are capable of explaining or clarifying the relationship between an independent and dependent variable. The mediated or indirect effect consequently runs from the independent variable (X) to the mediating variable (M) to the dependent variable (Y). The first leg of the indirect effect is labeled the *a* path and the second leg is labeled the *b* path. In the terminology of mediation analysis, the *a* and *b* paths comprise the indirect effect and the *c'* path, which runs from X to Y, represents the direct effect (see Fig. 1). It is important to understand that mediation presumes causation, hence the term causal mediation analysis. For this reason, mediation analysis is concerned with fundamental causal criteria like correlation, direction, and nonspuriousness (Bachman & Schutt, 2014). We begin, then, with a review of the five core requirements of causal mediation analysis.

2.1. Core requirements

There are several methodological conditions that should be present before a competent causal mediation analysis can be performed. These conditions are referred to as the core requirements of causal mediation analysis. The five core requirements described in this section are designed to illustrate how causal mediation analysis is more than a statistical approach, but rather a highly complex and integrated methodology composed of procedural/research design (causal order and causal direction), conceptual (confirmatory model) and analytic/statistical (evaluating significance, sensitivity testing) components.

2.1.1. Causal order

The first core requirement of causal mediation analysis is causal order, defined as the need for variables in a mediation analysis to be temporally ordered. What this means is that the independent variable (X) should come before the mediator variable (M) and the mediator variable should come before the dependent variable. The causal order requirement is based on the assumption that the variables in a causal mediation analysis are temporally arranged to infer causation (i.e., direction). Although concurrently measured correlated variables may be causally connected, we can have greater confidence in the causality of a relationship when direction accompanies correlation. The stringency with which research is evaluated using the causal order criterion varies among experts, and ranges from the largely permissive position adopted by Hayes (2013) to the more conservative position espoused by Cole and Maxwell (2003). There is currently no consensus on how strongly a study should adhere to the causal order requirement but there is little question that causal inference is of central importance to mediation analysis (VanderWeele, 2015). The position advanced in the present paper is that there are several different ways to establish causal order between variables, and that some of these ways are more trustworthy than others.

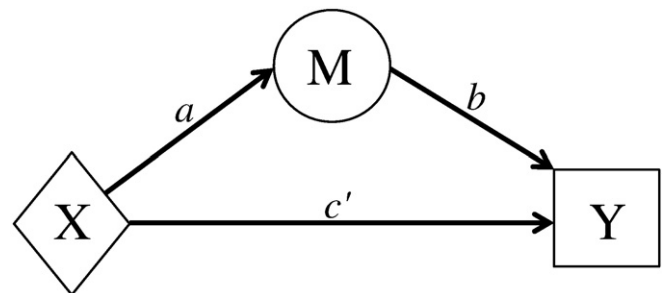


Fig. 1. Schematic diagram of the direct and indirect effects in a simple mediation analysis. Note. X = independent variable; M = mediator variable; Y = dependent variable; *a* = *a* path of the indirect effect; *b* = *b* path of the indirect effect; *c'* = direct effect.

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