

## MODERATION VERSUS MEDIATION

### OVERVIEW

Moderation and mediation are two essential concepts in social science research. Moderation and mediation analyses help researchers answer two important but very different questions. **Moderation** occurs when the relationship between two variables differs in magnitude, direction, or statistical significance based on the level on another variable. For example, the effect of a school disciplinary strategy on future behavior may be stronger for girls than boys. Moderation effects are also called *interactions*. If two variables interact, the effect of each on a third variable differs based on levels of the other. In the example above, the effect of discipline on behavior is moderated by gender; gender and discipline strategy interact to effect behavioral outcomes. In correlational research, moderation analyses allow us to understand how developmental processes may differ for students with different characteristics. In intervention research, moderation analyses allow us to answer the all-important question: for whom does an intervention work? In the example above, a moderation analysis can answer the question: Does a certain disciplinary approach work well for girls but not boys?

**Mediation** occurs when the effects of one variable (an independent variable, IV) on another variable (a dependent variable, DV) are explained by a third variable (a mediator). For example, imagine that a reading intervention (IV) is shown to improve standardized reading scores (DV) of students receiving the intervention. The reading intervention focused on word attack skills. Further analysis indicates that the reading intervention had a strong effect on word attack skills, and those skills had a strong effect on standardized reading scores. In fact, when the attack skills are included in the regression analysis, the previously significant effect of the intervention variable goes away. The effects of the intervention are *mediated* or *explained by* its effects on word attack skills. The intervention can also be said to have an *indirect effect* on the outcome, through its effects on skills. Mediation effects can be full or partial. In the former case, the direct effect of the independent variable becomes non-significant with the mediator in the model. In the partial mediation case, the direct effect of the independent variable becomes smaller but remains statistically significant. **Mediation** tells us how one variable affects another; or, by what mechanism an intervention affects an outcome.

### ARTICLES AND CHAPTERS

#### Description of Method

**Baron, R., M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182.**

*A classic article that describes the difference between moderation and mediation and lays out steps for testing for mediation using OLS regression.*

**Fairchild, A. J., & MacKinnon, D. P. (2009). A general model for testing mediation and moderation effects. *Prevention Science, 10(2), 87-99.***

*Provides an overview how moderation and mediation can be used separately as well as in combination. Includes practical examples for implementing moderation and mediation in a prevention program. Covers the issue of power and provides recommendations for researchers.*

**Gogineni, A., Alsup, R., & Gillespie, D. F. (1995). Mediation and moderation in social work research. *Social Work Research, 19(1), 57-63.***

*A user-friendly explanation of the concepts of moderation and mediation.*

**Lindley, P., & Walker, S. N. (1993). Theoretical and methodological differentiation of moderation and mediation. *Nursing Research, 42(5), 276-279.***

*Explains the conceptual distinction between moderation and mediation.*

### Applications

#### **Papers about Moderated Mediation, including Examples**

This link takes you to a page from which you can download papers about moderated mediation.

- [link](#)

### Special Issues and Extensions

**Emsley, R., & Dunn, G. (2010). Mediation and moderation of treatment effects in randomized controlled trials of complex interventions. *Statistical Methods in Medical Research, 19, 237-270.***

*Provides a review of historical literature about using mediation and moderation of treatment effects in randomized controlled trials. Introduces two methods such as principal stratification and structural mean models for the cases of testing regression effects for multiple groups.*

**Edwards, J. R., Lambert, L. S. (2007). Methods for integrating moderation and mediation: A general analytical framework using moderated path analysis. *Psychological Methods, 12(1), 1-22.***

*Provides an illustration of the advanced approach of combining moderation and mediation in regression and path analysis. Provides analytical frameworks as well as instructions for interpretation. SPSS syntax is also attached.*

**Hayes, A. F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach.* New York, NY: Guilford Press.**

*This text explains mediation and moderation, and then moderated mediation. Moderated mediation occurs when the mechanism of an effect of an IV on a DV differs across two or more*

*groups. The book includes information about freeware developed by the author to test moderated mediation. Links to information about freeware (Process Macro) are listed below.*

## SOFTWARE

Also see Software and Internet Resource sections of the Resource Guide on *Moderation in Regression*

### Statistical Packages for Moderated Mediation

#### PROCESS

##### **Process Macro Tutorial** (*Andrew F. Hayes*)

This UCLA Institute for Digital Research and Education (IDRE) page briefly explains mediation and moderation and then provides a tutorial on using Hayes' Process Macro for testing moderated mediation models.

- [link](#)

##### **Process Macro for SAS and SPSS**

You can download the Process Macro here.

- [link](#)