Workshop on Causal Mediation and Interaction Analysis

Date and time: May 17 (09:00-17:00) and May 18 (09:00-13:00), 2018

Venue: Elite Hotel, Carolina Tower (next to Karolinska Institutet)

Target group: Doctoral students, Postdoctoral fellows, Junior and Senior researchers, primarily from Karolinska Institutet.

More information and instructions on how to register will be sent out later on. No workshop fees, lunch is not included.

Instructor: Tyler J. VanderWeele, Ph.D., Professor of Epidemiology in the Departments of Epidemiology and Biostatistics at the Harvard T.H. Chan School of Public, Boston, MA, USA

About the instructor: Tyler J. VanderWeele, Ph.D., is Professor of Epidemiology in the Departments of Epidemiology and Biostatistics at the Harvard T.H. Chan School of Public Health, Co-Director of the Initiative on Health, Religion and Spirituality, faculty affiliate of the Harvard Institute for Quantitative Social Science, and Director of the Program on Integrative Knowledge and Human Flourishing at Harvard University. He holds degrees from the University of Oxford, University of Pennsylvania, and Harvard University in mathematics, philosophy, theology, finance and applied economics, and biostatistics. His research concerns methodology for distinguishing between association and causation in observational studies, and the use of statistical and counterfactual ideas to formalize and advance epidemiologic theory and methods. His empirical research spans psychiatric, perinatal, and social epidemiology; the science of happiness and flourishing; and the study of religion and health, including both religion and population health and the role of religion and spirituality in end-of-life care. He is the recipient of the 2017 COPSS Presidents' Award from the Committee of Presidents of Statistical Societies. He has published over two hundred and fifty papers in peer-reviewed journals, and is author of the book Explanation in Causal Inference, published by Oxford University Press. Link to website: https://www.hsph.harvard.edu/tyler-vanderweele/

Abstract

Causal Mediation Analysis: This part will cover some of the recent developments in causal mediation analysis and provide practical tools to implement these techniques. Mediation analysis concerns assessing the mechanisms and pathways by which causal effects operate. The course will cover the relationship between traditional methods for mediation in the biomedical and the social sciences and new methods in causal inference. For dichotomous, continuous, and time-to-event outcomes, discussion will be given as to when the standard approaches to mediation analysis are or are not valid and extending these to more complex settings. The no-confounding assumptions needed for these techniques will be described. SAS, SPSS and Stata macros to implement these techniques will be covered and distributed to course participants. The use and implementation of sensitivity analysis techniques to assess the how sensitive conclusions are to violations of assumptions will be covered, as will extensions to multiple mediators.

Interaction Analysis: This part will provide a broad introduction to the topic of interaction. We will discuss interaction on additive and multiplicative scales, and their relation to

statistical models (e.g. linear, log-linear and logistic models). We will describe procedures for interaction when logistic models are fit to data but when additive and not just multiplicative measures of interaction are desired. We discuss issues of confounding for interaction analyses and how whether control has been made for only one or both of two exposures affects interpretation. We further discuss conditions under which interaction gives evidence of synergism within the sufficient cause framework, when interaction is robust to unmeasured confounding, methods attributing effects to interaction, case-only estimators of interaction, and power and sample size calculations for interaction. Illustrations will be given from environmental, genetic, and infectious disease epidemiology. Software code will be provided.

Format: The workshop will be mostly lectures. There will be open discussions, software codes will be provided. Specific sets of problems will be distributed; solutions will be given but these will not be discussed in detail in class.

Host: Anita Berglund, Head Doctoral Programme in Epidemiology, Institute of Environmental Medicine, Karolinska Institutet.